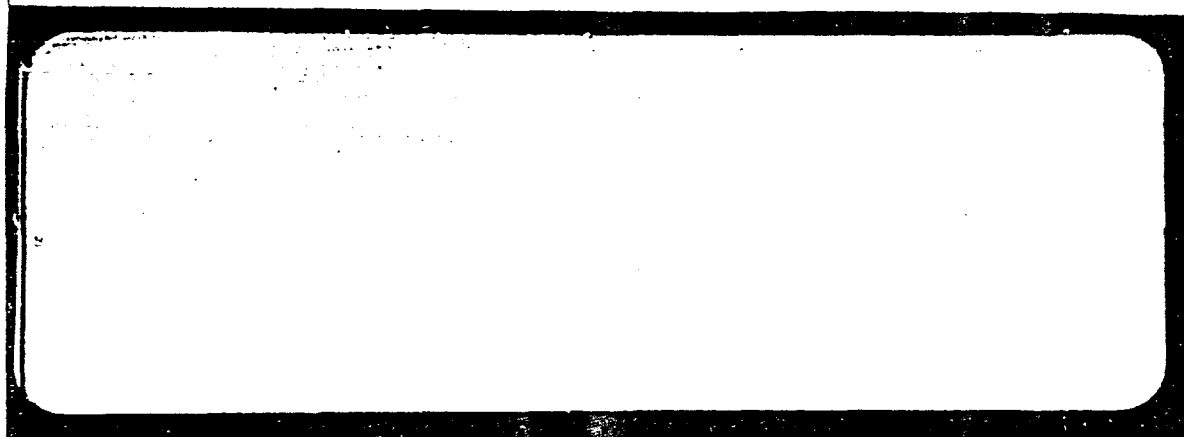


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TECHNICAL REPORT - SPECDEVCON 1257-1-1

CBR TRAINING AID REQUIREMENTS, ARMY WIDE

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FOREWORD

PURPOSE

This project was established to determine the training aid requirements for increasing the effectiveness and combat efficiency of officer and enlisted personnel in Chemical, Biological and Radiological Warfare (CBR). The training areas selected for study are listed in order of priority:

Army Wide CBR Training

Chemical Corps Units Training

Chemical Corps School Training

RESULTS

Requirements for training aids and devices were uncovered during the course of this study and are specified in the report. In order to achieve the goal of increased combat efficiency, certain steps in addition to the procurement of training aids and devices are recommended. The CBR Training Program is in need of:

More precise statements of training objectives in each subject matter area.

More effective methods of training which stress actual behaviour and "must know" information.

More realistic techniques for assessing the results of training.

Increased emphasis on student self-evaluation.



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IMPLICATIONS

Instructional aids yield the greatest payoff when the total training situation is properly structured. Thus, the recommended improvements in the training program should be undertaken concurrently with training aid development.

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BRIEF OF STUDY

Basic Individual CBR Training

- Most of the objectives of basic individual training in CBR warfare are stated in such general terms that developing a training program to achieve them is difficult.

Objectives should be clearly stated in terms of proficiencies expected at the end of eight weeks.

- A combined statement of stated and implied objectives in basic individual CBR training would be helpful to all training personnel, especially the new or unskilled instructor.

Every CBR skill that is supposed to be developed in eight weeks should be defined in measurable terms of speed, accuracy, sequence of steps, completeness of action, and similar observable responses.

- Some of the training outlined in Training Memorandum No. 7 is related only in a minor way to the objectives and is not necessary for survival and pursuit of mission.

Memo No. 7 should be redrafted to focus attention only upon basic training. Separate publications should be issued for advanced individual and unit training.

Screening smokes and incendiaries should be eliminated from prescribed content since they are not related to objectives of the 10-hour course.

- Some objectives are established which cannot be achieved in the specified time and with the present limitations on the use of live agents. There is no information or technique available to

the trainee which make field identification of war gases practical, or even possible at present.

Objectives should not be stated in such ideal terms that there is no possibility of achieving them.

Field identification of war gases with either the M9A2 kit or the "sniff" test should be eliminated from the CBR objectives of basic training.

- Memo No. 7 is not uniform in clarity. The level of readability is too high. The format and indentations are difficult to follow.

The revised manuscript for Memo No. 7 should be checked by a specialist in readability before publication. The outline and headings should follow a consistent form of indentation. Subheads should be expanded to give meaning to the information by clarifying the content.

- Discrepancies between current doctrine and obsolete practices emphasize the need for centrally-prepared lesson plans.

If the local preparation of lesson plans is continued, they should be prepared by the instructors who use them.

Practical learning exercises having local applications should be added to the content of the outline of Memo No. 7.

- The CBR information given to recruits is too technical and complex, and is not understood by many. Self aid, first aid, and protective actions are given too little emphasis and practice. An overwhelming amount of unnecessarily difficult words and phrases is used in instruction based on Memo No. 7.

The theoretical and technical portions of Memo No. 7 should be simplified. The use of some of the language, illustrations, and charts in FM 21-41 would be helpful.

Information on nerve, blister, and choking gases should be condensed.

- There is no systematic effort to find out what men have failed to learn in time to re-train and practice before the end of basic training.

Training centers should be given guidance in testing the results of training.

Knowledge of progress should be used as a stimulus to learning. A self-scoring technique should permit each trainee to check his own proficiency.

- Interest of the trainee is at its lowest point during the second 2-hour period.

Special attention should be given to maintaining interest in the protective action to take under spray and gas attack.

Training aids should involve the trainees in participation in the proper sequence of actions and measures.

- The timing and spacing of discipline and physical toughening activities from verbal learning are poorly scheduled.

Greater attention should be given to the physical condition of trainees if they are to remember verbal CBR instruction.

- Training policy is inconsistent regarding the grouping of men for instruction, and the attitude of instructors is negative. Illiterates are grouped separately for CBR testing but not for CBR instruction.

Experimental research should be conducted to determine the effectiveness of grouping basic trainees for CBR instruction on the bases of intelligence, educational background, and training methods.

- Too much nonessential information is crowded into the one-hour period on BW. Much of the content of the RW lectures observed is not related to protective action. The demonstration of smokes and incendiaries makes no observable contribution to CBR skill during basic training.

Safeguards should be established to limit formal instruction in the 10-hour course to essentials of action and performance.

NICE TO KNOW information should be made available to recruits, but only upon their own time, initiative, interest, and request.

Complete lesson manuscripts of what shall be said in lectures should be prepared for the 10-hour course.

- Instructors differ widely in the importance they attach to CBR proficiencies. They also indicate confusion about what trainees should be able to do at the end of the 10-hour course.

There should be a clear controlling statement of what should be taught, how to teach it simply, what skills should be demonstrated, and what level of skill should be shown by performance.

Action tests of CBR proficiency should be given before the end of basic training. Remedial training should be scheduled as extra duty.

- The objective of "familiarization" on page 40 of Memo No. 7 calls for a demonstration of decontamination materiel, whereas skill requires practice in the performance of decontamination.

Memo No. 7 should give more attention to the integration of CBR training with other basic training. Specific suggestions should encourage officers to have men fire a weapon, march, take cover, and the like while masked.

CBR basic training procedures should require active participation in learning identification, self aid, and decontamination—just as participation is gained in mask drill and gas chamber exercise.

A workable field identification technique should be sought for the individual soldier. Memorization of colors, tastes, smells, chemical and physical properties, and persistencies should be deleted from basic training.

- There is an amazing lack of central supervision of training practices in basic CBR training--a program that is carried on Army-wide to serve as pre-training for all arms and services.

Continuous experimental study and evaluation of basic CBR instruction should be provided. Instructors in the 10-hour course should receive direct benefit from the resources of a research, analysis, and curriculum section such as that operated at OulC School.

Advanced Individual CBR Training

- The second 8-weeks training policy is based on the assumption that men attain a definite minimum of skill during the first eight weeks. Yet deficiencies are not determined at the end of the first eight weeks or at the start of advanced training.

A general classification CBR test should be developed for use at the beginning of advanced individual training. It should be applied at the next duty station following the 10-hour course.

- Stated objectives have not been found to identify the improvement in CBR skills that is expected in advanced individual training.

Every ATP should define the minimum standards of performance expected for each objective established.

- ATP's and POI's in the "24" series identify neither the objectives of the courses nor the standards of performance required. Courses

for officers and men vary widely in content and yet overlap considerably. Apparently CBR training objectives are the same for officers as for enlisted men.

Proficiency standards should be stated in detailed specifications, clearly related to objectives, program content, time allotment, and performance tests.

- Except for masking in fifteen seconds, no guides are provided for judging proficiency in terms of time, accuracy, efficiency of motion, sequency of steps, economical use of supplies, and similar measures.

There must be positive means of identifying "fundamentals," "basic skills," and "initial proficiencies" for each trainee before "training will be progressive." Such means should be imposed Army-wide upon all phases of advanced individual training.

- Essential CBR proficiencies for all personnel fit into one or more of six abilities, and six additional CBR proficiencies for officers and noncoms are identifiable in the literature. Moreover, a level of competence higher than the Army-wide requirements is indicated but is never defined.
- CBR instructors in the Chemical Corps believe there are differences in the level of CBR skill that should be required for different MOS ratings, grades and ranks. However, there is no agreement as to which group should possess which level of skill or knowledge, and training policy identifies no differences.

If there are different levels of CBR knowledge and understanding needed by different grades and ranks, training programs should identify the levels in their objectives, courses, and ATT's.

If MOS's vary in the CBR field proficiencies required, ATP's should define them.

If there are no differences in levels of skill or understanding beyond a minimum standard, variations now outlined in courses and programs for various MOS's, officers, and men should be restricted.

- The published standards of individual CBR proficiency are applicable only at the end of individual training, and are stated only as minimums. The assumption that advanced individual CBR training is based upon basic individual CBR training and progresses beyond the basic training level is unwarranted.

The period of advanced individual training should be for the development of a high level of skill obtained through actual field exercises with CBR agents or simulants. Most of the time should be spent in integrated training. The 10-hour course should not be repeated.

- Cadre personnel show no consistent attempt to determine an individual's attainment of CBR proficiency upon his assignment to the unit. The quality of training provided by a cadre is sometimes lower than that provided in the 10-hour course. Quality varies with training competence in the cadre and also with the unit commander's attitude toward CBR training.

The scope of the program should be carefully outlined to prevent the present wide interpretations now made of the broad general statements in ATP's.

- A separate publication resembling Memo No. 7 is needed for advanced individual CBR training. The vagaries of unit commanders and cadres make uniform attainment of proficiency standards impossible.

Directives should be in detail so as to leave no doubts as to specific objectives, increases in level of proficiency, measures of satisfactory progress, and desirable integrated practice.

Lectures should be almost eliminated from the program. The 10-hour course should not be duplicated. Emphasis should be placed on direct firsthand experience and practice.

- Guidance is needed in designing and requiring CBR practice exercises.

Short films should be developed to expose the individual to various CBR situations. Then, decontamination should be learned by decontaminating, taking cover by taking cover, blotting off a probable blister agent by blotting it off in the field.

- The responsibility for conducting CBR training and determining CBR competence is vested in the same commander. Estimates of CBR training success are based on "training inspections." Such self-supervision is unsound training policy.

Central supervision should be established to coordinate and upgrade the program and quality of training during this second phase of CBR training, which is the most crucial for individual proficiency.

Chemical Corps Unit CBR Training

- The aims of CBR training in Chemical Corps units are not related to specific CBR proficiency.

More detailed statements of training objectives should describe CBR actions which characterize the efficient unit and criteria to guide the judgment of unit officers.

- Most CmlC ATP's review and/or teach again the elementary information on CBR warfare. Detection is omitted in the ATP's for maintenance and processing companies. Self aid and first aid are omitted in the smoke generating company ATP. Generally, ATP's make no mention of alarms, standard marking signs, or methods of delivering CBR agents.

ATP's 3-201, 3-203, and 3-205 should include organized practice in identification, since CBR attack on rear areas is possible.

ATP 3-201 should develop particularly effective teams in identification and skill in self aid/first aid, since smoke companies especially will operate in areas subject to CBR attack.

- Unit CBR training is the first phase in which the protective mask is not specifically singled out for emphasis. It is evidently assumed that every soldier has developed proficiency in masking.

Mask drill in the field and practice in maintaining items of individual and unit protection should be specified.

- Training in the exploitation of CBR situations is generally omitted from CmlC ATP's.

Considerable attention should be given to exploitation, including: avoiding contaminated areas, crossing or operating in contaminated areas, individual and unit SOP upon alarm, reporting attacks to adjacent units and higher authority, and making adjustments in operations as required to accomplish the mission under CBR conditions.

- The great majority of time in unit training is allotted to field training; but considerable training activity is devoted to the maintenance of basic combat skills, supply and logistics information,

and similar concerns. Too much of unit CBR training requires no trainee activity.

As quickly as possible field training should be removed from the simple but necessary practice variety to actual field operations, sometimes under adverse conditions.

Field exercises should not comprise only an occasional sporadic part of unit training but should be scheduled as a major part of it.

Critiques on individual and unit performance in these exercises should provide most of the instruction in all aspects of CBR training.

- Training of the individual in unit operations is accomplished by on-the-job training. A progress chart to show the stage of training or rate of progress of a trainee was not found. Nor was there found a job sheet giving a breakdown of the component steps in a specific skill or job.

Unit training officers and noncoms should be given guidance in the preparation and use of job analyses, job sheets, check-off lists, and performance standards for each skill. A progress chart should be maintained for each individual.

- Training tests that accompany the ATP's are designed to get verbal reactions to a field situation, also described verbally.

The skills expected in unit training should be defined in measurable units: size of folds, waste of solutions, breakage of eyepieces, estimates of wear or deterioration of face pieces, manipulative dexterity, and the like.

Special minimum standards of proficiency should be defined for each type of unit.

- Numerous interruptions of training schedules, personnel levies against the unit, the policy of individual rather than unit

rotation of duty, and the shortness of time between specialized training and discharge affect CBR training adversely.

At least in their earlier stages of training, men in CmlC units should be as carefully protected from interruptions in their training schedules as are students in CmlC School. Large blocks of time should be scheduled during which no interference with training schedule or activity will be permitted.

- Men in CmlC units report that the most difficult CBR topics to learn are RW, identification and the M9A2 kit, and names and symbols. Instructors say that BW and RW constitute 44 per cent of the most difficult topics to teach, and that identification constitutes 15 per cent. Unit training contains nonessential information and content that have no possible value in the field and are useless obstacles to the trainee.

There is little justification for the difficulty uneducated men are having in understanding only those CW, BW and RW skills they need in the field.

As soon as detailed standards of proficiency can be specified for each type of unit assignment, CmlC ATP's should be revised to eliminate NICE TO KNOW information from scheduled training.

- Enlisted trainees say that they need more practical experiences (live agents) and more time on difficult topics. Instructors say that more field work and more live agents are needed. These responses indicate that both groups recognize the need for a more realistic kind of training experience in CBR warfare.

The assistance of the Medical Corps should be earnestly solicited in identifying anatomical charts, models, pictures, and films that can be adapted to teaching the effects of those agents

units are not allowed to experience.

Urgently needed are CBR training agents which should hurt men when they commit errors without injuring them permanently. The severity of the physical or psychological penalty should increase with the level of CBR training.

- The problems of unit CBR training point up the need for unit instructors who can and will make CBR warfare understandable to uneducated men. Current problems clearly refute the Army's assumption that any noncom or officer can successfully teach his men anything they need to know.

An organized, scheduled, and mandatory program for upgrading the training skill of cadre personnel should be undertaken.

Courses in the Chemical Corps School

- The stated objectives of School courses do not identify CBR goals. A great deal of duplication exists between courses. There is no common understanding of what is to be accomplished in the allotted time.

Specific CBR objectives for each course should be stated in terms of duties, actions, and levels of competence which individuals must assume in CBR warfare. Courses should then be revised to eliminate unnecessary content and to add practice in field requirements.

- Every course outline assumes that the learners are ignorant about CBR warfare and starts all over with "introductions to," "definitions of," and "classifications used."

Pre-testing to identify what students already

know should be standard procedure. Course content and training procedures should be varied according to the backgrounds of individuals comprising the groups.

- CBR training outlined in POI's is mostly verbal, interspersed with occasional films and demonstrations. Only a minor portion of School course time is devoted to field training.

Many more opportunities for men to demonstrate proficiencies in the field are needed. Each man should have practical experience in performing his training drill in the field after the necessary basic skills have been learned.

- Courses preparing personnel for different duties should reflect these differences in the experiences provided. The presence of troop units near the School and of officers and men as School students provide all the resources needed for superior exercises.

Officers in training should be given command and staff duties in field exercises involving CBR warfare.

Men in training should practice under adverse conditions of weather, terrain, supply inadequacies, loss of leadership, loss of sleep, retrograde movements, and the like.

- An excessive amount of basic science and nonessential content is found in CmlC School courses. Much of the material in RW and BW is more theoretical than needed for field proficiency. Exploitation is slighted.

Much more careful development and coordination of courses should be sought. The recommended curriculum department, staffed with qualified specialists who have had field experience, should be responsible for developing courses with unity and sequence and which make sense to the learners.

- Little is included in any of the officers' courses on: hygiene and sanitation, maintenance and care of equipment, decontamination (especially of equipment), and operating in contaminated areas. Course 3-0-7 considers recognition only in RW. Courses 3-0-14 and 3-0-8 are the only two which consider the tactical use of agents.

The training programs in officers' courses should include all essential CBR content. Even in the specialized concerns of RW, attention should be given to the possible use of BW and CW under RW conditions.

- There is excessive subject specialization among instructor assignments in the School. Course 3-0-8, lasting two weeks or 98 hours, was taught by 35 instructors, 22 of whom met the class only once.

Experimentation should be conducted in using large blocks of time with one instructor, who in turn should have extensive field experience upon which to draw.

- A great discrepancy exists between the ranks of officers assigned to the CmlC School staff. The selection of instructor personnel seems to be a major problem—the turnover is high; the quality of teaching is only fair; and field experience is limited.

Continuous efforts should be maintained to improve the instructional skill of the school staff. A uniformly high quality of teaching competence should be expected on a permanent service school faculty.

- The variety of training aids available at the School is excellent, and their administration is efficient.

School instructors should be given further training in the proper selection and use of training aids, especially in the use of training films.

- Considerable time in the nine-months' advanced course for chemical officers is unnecessarily repetitious for many and too skimpy for others.

More time should be spent in training students in how they should conduct training when they return to their posts.

If considered desirable, a single course should be designated to provide the nonessential but broadening knowledge now included in every course examined. Then, differentiated programs based upon varied experience backgrounds should be developed.

- While classes are visited and test results are evaluated, there is little evidence of training research or experimental studies designed to improve CBR training.

A permanent Curriculum Department should be established to absorb the Research and Analysis Division and the Publications Department. Qualifications for the directing staff should be rigidly drawn to require a high level of professional training and experience combined with a comparable level of military training and field experience.

- The CmlC School provides no on-the-job service for chemical officers conducting CBR training at basic training centers and maintains no contact with them.

The recommended Curriculum Department should be charged with three principal functions:

- a. To conduct a continuous program of evaluation in CmlC courses and instruction.
- b. To engage in experimental studies designed to improve instruction and training in terms of field requirements.
- c. To serve as a resource center, available

to every CBR instructor in the Army, for the dissemination of new CBR training information and help in solving local CBR training problems.

Preparation for Overseas Replacement Training

- The scope and outline of POR training include all important CBR topics, but stated objectives have the same general vagueness that characterizes other CBR training. The implied goals cannot be achieved in the two hours. Content gives too little attention to improvised expedients. Verbal review is not a satisfactory procedure for POR training.

A sequence of practical drill exercises should be specified. These should require the same degree of trainee activity in identification, protection, self aid and first aid, decontamination and exploitation as the gas chamber provides. A CBR obstacle course should be provided.

- Emphasis on CBR changes and developments is sound but the effectiveness in POR training is questionable.

Up-to-date information should be gathered and forwarded to all CBR training activities more promptly and efficiently than at present if this POR objective is to be attained.

- POR training appears to be conducted apathetically.

Research should be conducted to determine: (a) if any increase in CBR proficiency results from POR training under present practices, and (b) time required in POR training to really accomplish its objectives.

CBR Training Aid Problems

- Many of the training aids listed in Memo No. 7 are not being used in the 10-hour course.

A kit or case should be fitted with a standard list of CBR training aids designed for the 10-hour course but available also to any T/O&E unit.

- No visual projection was seen in outdoor training anywhere in the Army; yet most CBR training is conducted outdoors.

Encouragement should be given to the development of outdoor visual projection during basic and advanced individual CBR training.

- No foxhole was observed at the scene of CBR training at any Army establishment, although it is a fundamental means of protection.

A permanent foxhole, well designed for protection against RW, should be constructed in the CBR training area at each basic training center. At some time during basic training every trainee should be required to take cover in it and to know the important features of the design.

- The GTA's listed in Memo No. 7 are available in platoon-size charts for basic training centers where company-size classes are conducted outdoors. Company-size charts are used in CmlC School which conducts platoon-size classes indoors.

This situation should be reversed. Basic training centers should have weather-resistant charts clearly visible and readable at 60 feet.

- CBR posters are conspicuously absent throughout the Army.

A series of colorful, forceful posters should be prepared for Army-wide distribution. They should portray CBR situations and emphasize field proficiencies.

- Filmstrips designed for teach-test-reteach-retest sequence are needed. Everywhere in CBR training there is almost complete neglect of the use of filmstrips, whose strong points complement the weaknesses of current CBR training films.

A series of CBR filmstrips should be prepared in color, portraying CBR field situations, and providing for critiques and self-testing exercises.

- At CmLC School training films frequently are too long, receive too little advance briefing and get almost no follow-up or discussion.

A series of short 3-8 minute CBR training films should be developed especially for unit and School CBR training. The series should present a wide variety of CBR field situations requiring individual and unit action. Each film should include the essential preview and follow-up narration.

- The gas mask and the gas chamber are the two most effective aids to learning in the 10-hour course.

Means should be provided for trainees to time themselves during gas mask drill. Masks should be issued as items of personal equipment to be maintained during basic and advanced individual training.

- In ATP's the greatest need for training aids appears to be in making practice situations realistic. Trainees need less simulation and make-believe, and more field experience with genuine penalties for faulty performance.

Real items of training aids should be in the hands of trainees while the instructor uses large models or charts. The integrated situations for CBR practice during unit training should include contact with live agents of a disagreeable but nonlethal nature.

- At every center visited, Field Identification and Self Aid in proper

sequence were the two MUST skills that appeared to be the least known, the least understood, and the least mastered.

More practice with training aids in field situations should take the place of the excessive verbalization, the unnecessarily difficult vocabulary, and the theoretical aspects of MUST knowledge that now burden trainees.

- Channels for the exchange of ideas and successful innovations in CBR training do not flow between CBR instructors at the different training centers.

A CBR training aid "clearinghouse" to help instructors should be operated on a positive, aggressive basis. A periodical newsletter with participation from all arms and services would be worthwhile.

- The development of "graphic arts" aids appears to monopolize most of the CMLC School training aids program. An excessive amount of NICE TO KNOW material is incorporated. In spite of its good training aid doctrine, the Army's CBR training film program is poorly developed as a substitute for real experience.

A defensible and adequate procedure, based on study and research, should be established for determining the need and justification for CBR aids and publications.

- The lag between principle and practice is as wide in the use of CBR training aids as it is in training procedures generally. A wide variety of good and poor practices was found at CMLC School, where practices may influence the way students will later instruct.

Instructor skill in the use of training aids should be improved. Specific training and practice should be emphasized in every program that qualifies Army instructors for any phase

of CBR training—basic, advanced individual, unit, and school training.

- The training aids listed for FOR training indicate that Army-wide individual CBR training is not aimed above the level of skill developed in basic training.

For maintaining familiarization with CBR SOP, a series of combat pictures showing CBR situations should be developed for automatic self-raters, if these devices are available to Army establishments.

- It is the firm judgment of all members of the project staff that lack of good training aids is not the real cause of any significant lack of training success in CBR warfare.

CBR Problems of General Interest

- Two major refinements in CBR training directives are urgently needed: (a) specific objectives for each phase of CBR training stated clearly as measurable evidence of field proficiency; and (b) measures of the minimum standards for each phase of CBR training developed as an integral part of every training program.

Measures of proficiency should meet the technical criteria of validity, reliability, objectivity, and practicality.

Trainees should be provided with self-testing measures.

Instructors should be provided with measures specifically designed for: pre-training analysis, diagnosis of learning difficulties, attainment of daily lesson objectives, and attainment of course or ATP objectives.

- A CBR proficiency test has validity to the extent that the skill;

measured by the test are similar to the skills to be exercised in combat.

Tests should require action rather than verbal responses. Such tests should be used at every level of CBR training for every skill involved in a standard of proficiency.

- The quality of a test response is of utmost significance: the promptness as well as correctness of decision, the proper sequence of correct actions, the efficiency of effort, and the proper exploitation of the SOP.

Minimum standards of proficiency should be defined in these detailed terms.

- Reliability is gained by controlling the conditions under which testing is conducted, by proper sampling of individuals, and by standardizing instructions and procedures.

CBR instructors should be given on-the-job training in the preparation and use of performance tests as training procedures.

- Objectivity or freedom from bias requires that judgment or scoring follow uniform standards.

Instructors and umpires should receive extensive training and practice in applying standards if they are to be objective in their testing.

- The 1954 Army-wide individual CBR proficiency test was one of the most effective training exercises observed during this study.

Performance exercises recommended for regular CBR training operations should conform to test criteria to the same high degree as the 1954 OCAFF test.

- The validity of the 1954 individual CBR test is assumed to be

acceptable. Reliability is good in some respects, poor in others.

Excessive bias in scoring is evident. Practicality is excellent.

OCAFF should continue the administration of Army-wide testing of CBR proficiency. This task should not be delegated to commanders responsible for the conduct of training. Improved means of judging CBR competence in maneuvers and joint operations (Flashburn) should be sought.

- The validity and reliability of a sample ATT (3-2) appear to be reasonably adequate; practicality is good; but objectivity and freedom from bias is poor.

The CBR portions of CmlC ATT's should be revised as soon as specifications for the proficiency standards are defined.

- Good testing of CBR training success is virtually nonexistent at stages when retraining would be possible.

The Army should be using the invaluable techniques of performance testing as training procedure, for assignment of trainees to sections, for program planning and curriculum development, and the like.

- Grouping for instruction at all levels of training is needed.

Much more opportunity should be provided for men of superior and inferior abilities to have training geared to their capacities.

- There is no more important, or in the long range crucial, task in the Army than training; yet training duty appears to be shunned by some experienced soldiers whose combat backgrounds are necessary for good training.

Army instructors should be rigorously screened for the training task, and rewarded with recognition comparable to that accorded the soldier who

performs brilliantly in a military skill.

- The first contact that basic trainees have with CBR instruction secures their interest and focuses their attention upon personal survival.

At each successive level of training, activities to develop comparable readiness and interest should be conceived and developed.

- CBR training publications are soundly based on what is known about how learning takes place.

Training operations should give more attention to: relaxing the pace of the training program; improving the training environment; limiting the presentation of new material to a maximum of four hours daily; scheduling of units or class sections for needed post duties to avoid individual absences from instruction; minimizing the interruptions of training schedules; and stimulating the interest of unit commanders in upgrading the training techniques of cadre personnel.

- Training frequently violates promulgated training doctrine and reduces training efficiency. Of twelve basic principles endorsed by FM 21-5, FM 21-6, and TM 21-250, violations of every principle are readily observable in each phase of CBR training.

The Army should inaugurate a program of supervising CBR training operations with the aim of improving the quality of CBR instruction. The task should be assigned at a level high enough to work simultaneously in the following ways:

- a. To coordinate CBR training activities between different Army areas.
- b. To work directly with CBR instructors on an Army-wide basis and also at specific training centers.
- c. To muster the resources of CBR science, combat

experience, and training competence.

- d. To work directly with the sources of supply of CBR instructors and training personnel.
- OCAFF has effectively made CBR training success a responsibility of commanders. It has not developed an adequate policy of evaluating the performance of this delegated duty. Commanders are left almost free to judge for themselves how well they are doing the job.

Persons should always be held accountable for their stewardship of any delegated responsibility. Supervision should be exercised by the delegating authority. Excessive bias now characterizing sporadic judgments should be corrected by continuous supervision of CBR training. Proof of training success should be required short of the ultimate test in CBR combat.

MILITARY CHARACTERISTICS

General Considerations in 10-Hour Course

Training Situation

The training program constitutes the first eight weeks of Army life for the new recruit. Basic training is conducted at various posts throughout the continental United States. The CBR course consists of ten hours of instruction grouped in from five to seven periods. Posts vary in the scheduling of these periods during the eight weeks.

Instruction is usually given to company size groups of 200 men. Classes generally meet on bleachers outdoors, but may on occasion meet in a sports arena, an auditorium, or a large classroom. The last row of men may be sixty feet or more from the instructor's platform. Electricity usually can be made available at the site.

Personnel Considerations

Trainees vary in education and intelligence from semiliterates to college and university graduates. They vary in their CBR background all the way from being unschooled to holding master's and doctor's degrees in physics, chemistry, or biology. The trainees with limited education or with low intelligence fail to grasp most of the verbal technical instruction. At one center the statistician reports that about 8 per cent of trainees are illiterate.

With a single exception, all CBR instructors at one center are

college graduates. Centers vary in this respect, however. Officers usually speak fluently and are well prepared. Noncom instructors vary widely in this respect. Instructors in company size classes usually have one or more assistants to supervise trainees and to help with class procedures. Instructors differ in their skill in using training aids.

The Training Problem

CBR instruction during basic training is expected to develop initial or embryonic skill in five field proficiencies: recognize a CBR attack; identify agent(s); use available protection; administer self aid and first aid; and decontaminate.

Difficulty in learning is affected by several factors other than ability of trainee or instructor. Active participation by the trainee is difficult to arrange. The use of live agents is prohibited and substitutes are poor simulants. Much of the instruction is verbal and technical; and trainees are tired, sleepy, and not always interested. Groups are too large to permit individualized instruction. Time is not provided for the assimilation of learning, for drill or practice or review. Nonlearners are identified casually or by accident.

Proposed Training Aid No. 1

LARGE FACED TIMER CLOCK

Purpose. To provide an easily controlled aid so that each man can time his own performance during gas mask drill. The device is also to serve as learning motivation by creating interest, self-testing, and yielding knowledge of results.

General descriptions. The clock should be mounted or hung on the lecture platform in full view of all trainees. The face should be two feet or more in diameter, constructed of plywood or similar durable material, and hinged in two joints running vertically through I and V and through VII and XI so that the device may be folded and stored. The face should be painted in four colors: a green sector from XII to III; a yellow sector from III to V; an orange sector from V to VII; and a red sector from VII to XII.

The clock should have one large "sweep second hand" geared accurately to register seconds. If designed as timer clocks used in training typists, the mechanism could be activated by one complete revolution of the hand turned counterclockwise manually. Because of its regular use outdoors in all kinds of weather, the device should be waterproofed and shock resistant. The storage container should be a box designed also to contain all other training aids for the 10-hour course.

Proposed Training Aid No. 2

ENLARGEMENT OF PROTECTIVE OINTMENT KIT, M5A1

Purpose. To make visible to trainees on the rear row the contents of the protective ointment kit, M5A1, during the oral description by the instructor. Actual kits should be in the hands of trainees during instruction so they could remove and replace the contents, identifying each item on the proposed aid.

General description. The smallest item should be large enough to be visible at a distance of at least 60 feet. The form or type of the enlargement is of secondary importance. Preference is probably in this order: large working model; "breadboard" of oversize components; large durable pictorial chart of blown-up contents; transparency for outdoor projection; "breadboards" of actual contents mounted in several places in the training area. The device should be weather resistant, and should be demountable and folding for storage in the training aids box.

Proposed Training Aid No. 3

CBR OBSTACLE COURSE LAYOUT

Purpose. To provide directions, drawings, and specifications for a CBR obstacle course adaptable to local space and terrain. The layout should afford situations calling for the exercise of all five essential skills in order to encourage practice of CBR proficiency during basic training.

General description. Directions should include a narrative description of the purposes of the layout, explaining the desirable sequence of obstacles, the space relationships between them, and the actions they are to elicit. Detailed drawings should be blueprinted to permit local construction of materiel. Instructions and specifications for the preparation of areas, contamination procedures, safety precautions, and guides for the evaluation of performance should be included. The material should be durable, such as blueprint paper or tracing cloth.

Proposed Training Aid No. 4

PICTURES FOR LOCALLY-PREPARED CHARTS OF CBR EQUIPMENT

Purpose. To provide training centers with accurate enlargements of photographs of CBR standard items for making company size charts.

General description. One set should be prepared for each of the following: the Protective Mask; the MSAL Protective Ointment Kit; the M9A2 Identification Kit; and Contamination Markers with correct lettering.

Photographs should be in natural colors. There should be a picture of each component part of the equipment item, a view of the whole assembly, and cut-away views. Enlargement should average about 3x or 4x to provide good visibility at 60 feet; small components should have larger scales.

The photographs should be prepared on cloth backing for cut-outs or on cardboard for punch-outs. When glued to plywood or Masonite and varnished the pictures should be weatherproof and durable. The charts should be exhibited during lectures on the use of the CBR equipment; actual items should be in the hands of all trainees and the instructor during the lecture.

Proposed Training Aid No. 5

DRAWINGS AND SPECIFICATIONS FOR PERMANENT FOXHOLE

Purpose. To provide a standardized training situation in order to give every recruit a clear understanding of a properly-designed shelter for protection against CW and RW.

General description. Each basic training center should be required to provide properly-designed permanent foxholes, with overhangs, at the site of outdoor periods of CBR instruction. None has been seen anywhere in CBR training. The materials used are not important to the training task; they may be masonry or concrete for durability. Of utmost importance is the design, size, and shape. With the real foxhole the trainee can gain a clearer understanding of protective measures against radiation.

The drawings should include scaled plans, elevations, and sections for three dimensions. Specifications should include directions for construction and suggestions for use. The aid should be prepared on durable material such as blueprint paper or tracing cloth.

Proposed Training Aid No. 6

SET OF LARGE COLORED CHARTS ON CBR WARFARE

Purpose. To make available to training centers useful CBR charts large enough for good visibility in company-size classes.

General description. The charts should be issued in company-unit size, approximately 5' x 7'. They should be printed in color with cloth backing for gluing to plywood or Masonite and weatherproofing, or for attaching to rods or rollers for hanging and storing.

Text of the charts should not be determined until the recommended manuscripts for the 10-hour course have been prepared. The set should include, however, the following items in particular:

1. From GTA 3-1, Charts No. 10 on Nerve Gas Symptoms (if revised), No. 11 on Nerve Gas First Aid, No. 14 on Blister Gas Symptoms, No. 15 on Blister Gas First Aid, No. 19 on Detection, No. 29 and No. 30 on Radiation (if revised), No. 34 on Protective Equipment (if revised), and No. 35 on Markers.
2. Selected GTA 3-3 charts on decontaminants.
3. A pictorial chart on the ten commandments for defense against BW (pages 98-99, FM 21-41).
4. Charts on protection against and decontamination of RW (pages 128-129 and 134, FM 21-41).
5. Three special charts portraying sequence of protective action under CW, Bk, and RW attack.

Proposed CBR Training Aid No. 7

SERIES OF SHORT COLOR FILMS FOR CBR INSTRUCTION

Purpose. To introduce men to CBR warfare and to give them demonstrations of correct action under CBR conditions.

General description. There is no training film that properly meets the needs of CBR training. The proposed series should be short color films from three to five minutes in length. They should immediately place the man in CBR situations while his personal problems in CBR warfare are discussed and he is introduced to CBR training. Separate short films should be prepared for CW, BW, and RW. They should introduce men to general characteristics of attack, symptoms, and self aid and first aid for nerve gas, blister agent, and radiation. Films should concentrate on: impossibility of identifying agent by sight, smell, or color; effects of contamination, showing actual results, if possible, to emphasize rapidity of action; demonstrating that protection is available to any soldier who knows how to use his standard equipment effectively; and leading into a study of the elements and sequence of proper actions.

Proposed Training Aid No. 8

SERIES OF SHORT COLOR FILMS FOR CBR DRILL

Purpose. To create CBR situations as realistic as possible, to involve trainees in visualizing themselves as participants in the action, to make it necessary for the instructor to preview and follow up the film by discussion and critique, and to standardize training by providing correct examples of behavior and action under CBR conditions.

General description. Several reels of CBR situations should be developed in accordance with the proposed revision of the 10-hour course content. The reels should present as realistically as possible CBR combat situations in which a man can identify himself with a person in the film. Narration on the film should be used to describe CBR factors in the situation which would have a bearing on the proper action to take. The picture of the situation and the mission of the persons, presented in not more than three minutes, should be followed by the command, "ACTION." The situations should be separated from one another by blank film (short leads) during which the operator will stop the machine, the men will demonstrate CBR proficiency, and then the instructor will lead a critique.

Each reel should contain about ten different situations selected for the specific proficiencies to be taught: nerve gas attacks, blister gas attacks, BW and RW situations, and general review. The Army film library should be searched for actual combat scenes, on which new sound tracks must be duplicated in. New development may require staging.

Proposed Training Aid No. 9

SERIES OF CBR FILMSTRIPS

Purpose. To confront men with an unlimited variety of CBR situations in which proficiencies can be practiced and with which discussions and self-testing can be guided.

General description. A series of filmstrips should be produced in color. Pictures should show men in various kinds of possible CBR situations illustrating terrain, weather, Army units, methods of attack, and the like. Each picture frame should be preceded by a description of the pertinent factors involving perception or judgment, and should be followed by a critique of correct SOP in the particular situation.

The last part of each strip should show a series of similar prologues and pictures, but following each picture the viewer should be directed to demonstrate proper action before the correct solution is presented. Thus, each strip will end with proficiency test exercises, with the testing to be used for training and self-testing rather than for grading or proficiency rating purposes.

Proposed Training Aid No. 10

CBR POSTER SERIES

Purpose. To remind men continuously of the importance of CBR preparedness, to review the proper measures to take under CBR conditions, and to maintain the interest of men in CBR proficiency.

General description. A series of colorful, forceful posters should be prepared for Army-wide distribution. They should portray action lessons. Quantities are required for bulletin boards, post theaters, recreation centers, mess halls, barracks, and other places where the trainee is away from class or instructor. Code numbers should make it easy for changes in CBR equipment or in SOP to be incorporated promptly in new posters and to delete obsolete items. One series for basic training, one for unit training, and one for service schools are indicated, paralleling the three levels of CBR proficiency. Their justification is the need for continuous attention to CBR SOP and proficiencies, whereas, at present comparatively little is ever heard of CBR after the trainee completes 10 hours of basic training.

Proposed Training Aid No. 11

SIMULATED CBR AGENTS

Purpose. To expose trainees to contaminants that will actively and positively encourage the mastery of CBR skills, especially protection, self aid, and decontamination.

General description. There is no greater need for CBR training aids than the need for realistic substitutes for live CBR agents. A trainee contaminated by the substitute agent should be hurt, or be made very unhappy and uncomfortable, without permanent damage or injury.

Agents should react to standard reagents and identification equipment (M9A2 kit, Geiger counter, etc.). Their chemical action should be stopped by application of the proper decontaminant (M5A1 ointment, BAL, water, etc.). Odors of the agents should be controllable to resemble "horseradish" or "bitter almonds" or "fruity smells" or none at all. Proper decontamination procedure promptly followed should neutralize the effects.

The severity of the punishing effects might be graduated according to the level of proficiency expected. In basic training a telltale permanent dye, soluble in M5A1 ointment if applied promptly, might substitute for the physiological effects induced in advanced levels of training. Non-lethal vomiting agents might be the basic ingredient for producing the desired "casualties."

Proposed Training Aid No. 12

CBR SET FOR AUTOMATIC RATERS (SDC DEVICE S-0-2)
(If devices are used by Army)

Purpose. To provide opportunity for men in off-duty hours to continue to learn proper CBR actions.

General description. A picture should be shown with one or more men in a C, B, or R situation. The scene should be exposed for about ten seconds. Then a card should show simultaneously from four to eight different ways of acting in the situation which was presented. This presentation also should be pictorial, not verbal, and should be exposed for about thirty seconds. At the end of this time the man should select his answer. Each answer should be given a score weighted in terms of the relative effectiveness of the action selected. From five to ten exercises should be included in the set. If eight different sets should be developed, a new set of situations could be placed in the machines each week during basic and advanced individual training.

ARMY REQUIREMENTS FOR CHEMICAL, BIOLOGICAL,
AND RADIOLOGICAL (CBR) WARFARE TRAINING AIDS

Section I

INTRODUCTION

This study has been directed toward training aids needed in chemical, biological, and radiological (hereafter called CBR) warfare in order to increase the effectiveness and combat efficiency of officer and enlisted personnel. Improvements in the CBR training aids program should result in the attainment of a higher degree of proficiency of training in CBR warfare with shorter time requirements.

Every item of pertinent Army literature examined clearly shows that the contribution of training aids to successful training cannot be isolated from consideration of other factors influencing learning. The nature of the trainee, the training skill of the instructor, the methods of training, conditions in the training environment, the complexity of the proficiency to be developed, opportunities for practice, and time for assimilation are among the numerous forces that influence training success. The progress of the learner is the resultant of these forces.

The main purpose of a training aid is to increase the efficiency of the learning process; that is, to counteract influences that retard learning, to supplement those that encourage learning, and to increase proficiency

with greater economy of time, materiel, and effort. Consequently, it has been necessary for the project staff to consider numerous aspects of training problems in order to appraise the CBR training aids program in proper perspective.

The staff has given its most intensive and thorough consideration to the phase of CBR training which has top priority—the Army-wide 10-hour course in basic training; and to the 2-hour preparation for overseas replacement (POR) course. Detailed attention has been given also to Chemical Corps (CmlC) military occupational specialty (MOS) training, and troop unit training—the programs ranked next in priority. Finally, a general survey has been made of Chemical Corps School courses, which were assigned third priority by the study outline.

Procedures

The appraisal of training problems has been conducted by experienced professional educators. Emphasis has been upon the practical, operational aspects of training. Findings are the pooled judgments of specialists rather than the analysis of quantitative data. No effort has been made to use experimental techniques, nor to make a scientific study of discrete training problems under controlled conditions.

Staff orientation. Four of the five senior staff members served as military officers during World War II, and one also served in the Mexican Campaign and World War I. However, none of the staff had any experience with the Chemical Corps. In order to become fully oriented in the subject matter of Army CBR training the group enrolled in and completed CmlC School Course 3-0-8. This experience also gave further insight into Army training

practices, and permitted numerous discussions and conferences with Army personnel.

Conferences. A conference was held 10-11 December 1953 at Navy Special Devices Center (SDC), attended by the project staff, SDC project supervisors, and representatives from the Office, Chief of Army Field Forces (OCAFF); Office, Chief Chemical Officer (OCCmlO); and the Chemical Corps Training Command (CmlC Tng Comd).

The project staff was represented at the briefing conference held 11-15 January 1954 at Ft. McClellan prior to the annual OCAFF CBR test program. The proficiency tests were studied, and a schedule was arranged for staff members to meet testing teams at various military installations.

The staff was represented at the 12-14 January 1954 conference at Ft. McClellan on requirements for FY55 publications, training aids, and films. At this meeting, informal discussions were held with various participants from three Army areas, OCAFF, OCCmlO, CmlC Tng Comd, CmlC School, CmlC Board, Office of CBR Doctrine, 100th Cml Group, Signal Corps Photographic Center, and the Air Force CBR Section.

Several conferences to discuss the project plans, procedures, and reports were held at Ft. McClellan, on the Contractor's campus, and at SDC.

Field visits. Various members of the staff visited troop unit training activities in the 100th Cml Group. The basic CBR 10-hour course and a limited amount of POR training were observed at Ft. Dix, Camp Gordon, and Ft. Jackson. The OCAFF CBR testing program was observed at Ft. Benning and Ft. Campbell. A staff member was an observer of CBR play in Operation

Flashburn 26-28 April 1954. Thus, the staff has observed directly various phases of CBR training in the field, and has had many valuable conferences with a wide variety of Army personnel involved in CBR training.

Interviews. At two centers conducting basic training a prepared "interview guide" was used as a basis for consulting with randomly selected officers and enlisted men--instructors and trainees. At another center, personnel were selected from the 10-hour course and a post-cycle training program, and the interview blanks and check list published in Human Engineering Report SDC 383-04-1 were used. Thereafter, the project staff prepared and used one report form for instructors and another for trainees. These forms were little more than an invitation to the respondent to comment in detail on the easy-to-learn and hard-to-learn elements in CBR training, and the role of training aids in these particular problems. The forms also sought suggestions of training aids needed or considered desirable. With slight modifications the forms were used with officers and men in the 100th Cml Group and in CmlC School.

Another form was prepared for a sampling of noncommissioned and commissioned officers, including all MOS classifications in the Chemical Corps and personnel on the staffs of the training command, the School, and the troop units. This form listed a summary of the CBR proficiencies or skills that could be identified as training goals. The respondent was asked to indicate which level of proficiency (highest, average, or minimum) he considered necessary in each skill for the various grades, ranks, and MOS groups of Army personnel. These replies were an indirect estimate of the emphasis that each skill should be given in different phases of CBR training.

Literature. Working on the campus and in the Curriculum Laboratory maintained by the Contractor, the project staff evaluated Army literature authorizing, outlining, and supporting CBR training. These documents included: Change No. 3, SR 600-175-20; SR 220-180-5; ATP 21-114; OCAFF Training Memorandum No. 7; CmlC ATP's; CmlC School POI's and sample lesson plans; SR 615-25-15; TM 12-406; OCAFF CBR Proficiency Tests; CmlC ATT's; and numerous field manuals and technical manuals.

The practical aspects of CBR training as actually being conducted in the field have been related to the policies and principles appearing in the Army literature. These findings have been brought to bear upon the study of CBR training aids and devices. The training aids considered were identified from catalogues, lesson plans and POI's, training directives, and those made locally and observed in actual use.

Conclusions

Early in the progress of the study the staff was asked, "What if this study reveals that CBR training problems are not due to lack of aids, and the report tells the Army only those facts it already knows?" At that stage, the staff could only wonder, "Then why doesn't the Army do something about the recognized problems?" It is now evident that an improved training aids program will improve the level of CBR proficiency, but it is equally clear that the Army must narrow the gap between its training policies and practices—what it says and what it does—before CBR training objectives and proficiency standards can be reached. This report shows why.

Section II

INDIVIDUAL CBR TRAINING: 10-HOUR COURSE

This section is an analysis of the 10-hour course in Individual CBR Training, the part of the total project which had highest priority. It deals with the objectives, conduct of training, and the problems arising therefrom. The section concludes with the project staff's recommendations.

Sources of Information

Policies governing CBR warfare training were examined in OCAFF ATTC-31 352/69 (17 March 1953), Common Subjects Letter; OCAFF Training Memorandum No. 7 (31 March 1953), Chemical, Biological and Radiological Warfare; OCAFF Training Circular No. 16 (22 June 1954), CBR Training for FOR Qualifications; FM 21-40, Defense Against Chemical Attack (March 1954), Tentative Revision; FM 21-41, Soldier's Manual for Defense Against CBR Attack, (April 1953); ATP No. 21-114, Basic Combat Training; and lesson plans produced at training centers. Not only are these documents statements of training policy, but also they outline suggested programs of training in CBR warfare for individuals and units. In addition to documents and other printed matter, the sources of information included observation of instruction; interviews with instructors, staff personnel, and enlisted men in training.

Objectives of Individual CBR Training

Training in CBR warfare is started early in the Army recruit's military career. Memo No. 7 states that the basic 10-hour CBR course "will be completed not later than the seventh week of the training cycle." The recruit's training in CBR warfare is continued in advanced individual training, and it may be concluded with POR training just prior to overseas shipment. Since these three stages are conducted in sequence, it should be assumed that each has the same general objective and, following the preceding phase, each has a particular purpose or emphasis that differs to some degree from the others.

Stated Objective of Individual Training

Memo No. 7, page 3, states that the objective of individual training in CBR warfare is "proficiency in those protective measures employed by the individual in order to survive CBR attack with minimum reduction in combat effectiveness." Official Army publications recognize the crucial importance of establishing training objectives which are practical in terms of "the exact procedures and information required for field use."¹ The objective stated in Memo No. 7 can serve only as a general aim and not as a training objective, since it does not define the information and skills required in the field.

Implied Objectives of Individual Training

There are other objectives that are not expressed or stated. From an examination of the scope of training, it is clear that some training is

1. TM 21-250, p. 13.

included which is not closely related to the general objective but which may imply other goals. These goals are considered to be objectives implied from scope. There are still other objectives, recognizable as such, that have been incorporated in standards of proficiency.

Exhibit A lists the aims and objectives that are stated or implied for individual training in Memo No. 7. They are listed in the order in which they appear with no attempt to combine them or to recognize their similarity. Overlapping is inevitable, of course, since both general objectives and the specific aims of segments of training are included.

EXHIBIT A

Tabulation of Objectives of Individual CBR Training as Stated or Implied in Training Memorandum No. 7

Stated Objective

- a. Proficiency in those protective measures employed by the individual in order to survive CBR attack with minimum reduction in combat effectiveness. p. 3.

Supporting Objectives from Lesson Outlines

To teach basic techniques in adjusting, wearing, and maintaining the protective mask. p. 11.

To teach recognition, general characteristics, and use of chemical agents. p. 11.

To teach self aid and first aid procedures for chemical casualties. p. 11.

To orient trainee generally to screening smokes and incendiaries. Implied from Scope. p. 12.

To teach the soldier the protective actions he can take against biological warfare (BW). p. 25.

To explain the nature of BW so that the soldier has a common sense understanding of this type of warfare. p. 25.

To acquaint each individual with the capabilities, effects, and protective actions in atomic warfare in order that he, as a member of a unit, may continue to operate efficiently in the performance of his mission during atomic warfare. p. 33.

To develop individual proficiency in the use of the protective mask in actual gas concentrations. p. 40.

To develop individual proficiency in field identification of war gases. p. 40.

To familiarize individuals with items of decontamination supplies and equipment which are normally available to the soldier under combat conditions. p. 40.

To give trainees opportunity to apply what they have learned concerning CBR in simulated field conditions, with emphasis upon continuing the combat mission. Implied from Scope. p. 46.

Critical Analysis of Objectives

From a careful study of Exhibit A several generalizations can be made:

First, some of the objectives cannot possibly be achieved in the specified period of training with the equipment provided and with the current restrictions upon actual experience with live agents. It may be that objectives such as "development of individual proficiency in field identification of war gases" should be listed for morale purposes or even as a hope that eventually many men may achieve them. It should be recognized, however, that there is no information or technique available to the trainee which will make field identification practical, or even possible under current training policies.

Most trainees, having experienced the gas chamber exercise, realize that they should mask in the presence of an agent that irritates the eyes excessively; but there are numerous nontoxic substances which also irritate

the eyes (sweat, tobacco, exhaust fumes). Assuming that the trainee suspects the irritation is from a chemical agent, his latest field manual (FM 21-40, March 1954, Tentative Revision) will tell him these symptoms: mustard blister, "smarting and watering of the eyes"; arsenical blister, "irritation of the eyes"; nerve, "running nose, pain in eyes"; choking, "inflammation of nose and throat"; blood, "irritation in nose and throat and eyes"; vomiting, "irritation in nose and throat"; tear, "irritation of eyes"; and even screening smoke, "possible nose and throat irritation."

The same informational source tells him that nausea and vomiting may result from as many as five of these same agents. Seven of the eight are described as possibly colorless. Three of the seven are either colorless or range from light to dark brown (such as clear water, muddy water, crankcase oil, etc.). One has a "fruity but biting" odor of geraniums! Another has a "bitter almond or peach kernel" odor, except that its "odor, if any, is very faint." Another smells like new mown hay (perhaps a good odor), or green silage (a soured odor not like new mown hay), or green corn or flypaper. Another smells like "burning fireworks" (in combat?). One gas is described as "canary yellow or white or colorless."

Publications stress the importance of identifying blister and nerve agents as the principal war gases, neither of which in relatively pure form can be identified with proficiency by smell, taste, or sight. These leave the sense of touch, but neither blister nor nerve agent can be identified by initial contact. The "achievement of proficiency in field identification of war gases" as an individual proficiency is remotely probable only if the trainee has actually experienced the agent in a field or realistic

situation. If this experience is judged to be too hazardous in training, then either the objective should be modified to permit at least a reasonable degree of attainment or better means of identification for use by the individual soldier should be developed.

Second, some training which is outlined in Training Memorandum No. 7 is related only in a minor way to the objectives. Although the analysis of content in relation to objectives is another problem, it seems desirable to point out at this time that much of the material outlined is not necessary for survival and pursuit of mission. For instance, it matters not which rays injure; but how to protect oneself from dangerous radiation matters vitally. It is also apparent that trainees are being "treated" to interesting and colorful displays of signal and screening smokes and incendiaries as part of a demonstration in individual training, when the probable use for either is related to unit activities in which more time for such training is available.

Third, most aims and objectives of basic training in CBR warfare are so generally stated that developing a training program to achieve the objectives is difficult. It appears that each special section of the Chemical Corps (chemical, biological, radiological) has been responsible for outlining a segment of training to be included in the 10-hour course. A more realistic approach would be to base objectives of training on the development of the skills, attitudes, knowledges, and actions evidenced by the trained soldier. Objectives would then result from analyses of practical duties in field situations rather than from judgments of highly skilled specialists as to what constitutes good subject matter.

Fourth, a combination of the stated and implied objectives in basic training would be valuable to the new or unskilled CBR instructor. An illustration of this suggestion is presented in Exhibit B. It combines the statements of objectives as gleaned from Memo No. 7. Statements have been developed to encompass all objectives so as to indicate the training tasks in several important areas. Such statements, revised as necessary by properly qualified personnel, not only would clarify the training problem but would also make it possible to plan learning activities which would more nearly insure the mastery of skills needed in the field.

EXHIBIT B

An Illustration of an Organized Statement of Objectives

for Individual Training as Listed in Training Memo No. 7

Objectives Which Indicate Training Tasks More Clearly

To insure proficiency in those protective measures employed by the individual in order to survive CBR attack with minimum reduction in combat effectiveness. p. 3.

- I. RECOGNITION--To train each individual, using individual equipment or improvised means, to recognize CBR attacks, methods of delivery, and alarms. p. 3
 1. Recognition, general characteristics, and use of chemical agents in the field. p. 11; p. 40; p. 67.
 2. The nature of BW so that the soldier has a common sense understanding of this type of warfare. p. 25.
 3. The capabilities and effects of atomic warfare. p. 33.
 4. SOP for alarms, and standard marking signs which indicate CBR contaminated areas. p. 67.

- II. PROTECTION--To train each individual, using individual equipment or improvised means, to take appropriate protective action. p. 67.
 - 1. Basic techniques in adjusting, wearing the protective mask. p. 11; p. 40; p. 67.
 - 2. Protective actions against BW. p. 25.
 - 3. Protective actions in atomic warfare. p. 33.
 - 4. Maintenance and care of protective equipment. p. 67.
- III. SELF AID AND FIRST AID--To teach self- and first-aid procedures in chemical and radiological warfare. p. 11; p. 38.
- IV. DECONTAMINATION--To teach simple decontamination of person and equipment. p. 40; p. 67.
- V. EXPLOITATION--To teach crossing or avoiding CBR contaminated areas. p. 67.

Analysis of Training Memorandum No. 7 and Lesson Plans

All CBR course outlines and lesson plans in use at the basic training centers visited were based on Training Memorandum No. 7, with this important guide constituting a syllabus for the 10-hour course. In order to evaluate the impact of these documents upon the training programs observed, the staff subjected them to a curriculum laboratory analysis, using criteria and procedures commonly applied to similar materials in educational institutions.

Appraisal of Training Memorandum No. 7

Criteria of a good course outline may be grouped to correspond with official training principles. Training Memorandum No. 7 was evaluated on the basis of the following questions:

Objectives of the Course

1. Does Memo No. 7 contain or identify general objectives?
2. If so, are they based on a job analysis? (TM 21-250, p. 12)
3. Does Memo No. 7 identify specific objectives?
4. Are the specific objectives based upon an MOS (enlisted) or Officer Classification (SR 615-25-15) (TM 12-406)?
5. Do the specific objectives fall within the scope of the general objectives? Should any be omitted? Should any be added?
6. Are specific objectives simply and clearly stated?

Organization of the Course

7. Does Memo No. 7 have unity and continuity?
Does it have a good teaching sequence?
8. Do the "subjects" consist of "broad blocks of skills"?
(TM 21-250, p. 20)
9. Is Memo No. 7 organized into a series of functional units?
10. Are the headings helpful to the reader?
11. Is the arrangement on the page helpful?

Learning Procedure

12. Is the teaching procedure clear and complete?
13. Does it emphasize practical experiences?
14. Do the learning activities reproduce or simulate combat situations? (Are they genuine?)
15. Are suggestions given for integration with other problems?
16. Does Memo No. 7 contain practical tests of the results of training?

Informational Content

17. Is the language simple, clear, and readable?
18. Is content more theoretical or technical than required by the objectives?
19. Does it include irrelevant material?
20. Would illustrations and examples help?

Teaching Aids

21. Are additional teaching aids needed?
22. Are references too few, too numerous, complete, etc.?

General Comments

Training Memorandum No. 7 is not uniform in clarity. Some parts are complete statements while others are in only outline form. A series of

discrete words following a main heading gives no indication of the thought or emphasis. For example, the appearance of an atomic explosion is developed in an outline containing eight single-word subheadings such as air, flash, fireball, and the like. Unless each of these words is expressed in a sentence, the reader is left with a vague idea of its meaning and direction.

The memorandum should be rewritten on a lower level of readability.

Such terms as lymphatic system, pulmonary edema, residual radiation, sustained concentration, and explosion phenomena are difficult for persons with limited verbal background to grasp. If possible, a simple synonym should be substituted; if not, the term should be followed by an understandable explanation.

The format and indentations are difficult to follow.

Side headings are not consistent—some run with the paragraph while others are on a separate line.

Specific Suggestions

The general objectives on page 3 can be stated more simply, briefly, and clearly; as, "b. To help the unit do its job with the least loss of men, time, and equipment." In the subject schedule on page 8 the gas chamber exercise might precede BW, because it is the next logical step after CW.

Period 1, pp. 10-24. The outline on page 14 is too skeletal. Sentences should be substituted for single words in the outline. The same is true of pages 16-19.

Background information on the gases is too technical. It can be considerably condensed and simplified.

The suggested technique for detecting a radioactive substance (2b, page 21) probably should be moved to a more appropriate place, such as where the topic is treated in the course. Other suggested exercises should be detailed in connection with the topics to which they pertain.

Period 2, pp. 25-32. The material in this section is too much to cover in one hour. It should be greatly condensed or eliminated from the course. Gas mask drill and contamination markers in color should be added. Instead of delivery of attack, paragraph d, FM 21-41, page 91—which describes the appearance of five clues—should be used. The charts on the "Ten Commandments" on pages 98-99 of FM 21-41 should be introduced here.

Period 3, pp. 33-39. The content material should be simplified to omit the theoretical aspects of radiation and to avoid technical terms. On page 33 the objective is too general. It should be broken down into simple and specific goals, such as:

- a. To act to protect himself properly against the blast, heat, and radiation effects of atomic explosions. (This is SOP 11 on page 68.)
- b. To give self aid and first aid for injuries from an atomic bomb.

If instruction is outdoors, the trainees should inspect a properly prepared foxhole. Although they may dig them later, it would help trainees to see one properly prepared for this learning exercise. The appendix on page 65 of Memo No. 7 pertaining to a cross-section foxhole should be incorporated in the lesson plan for use indoors. If a suitable film is not

available, heavy paper, plywood, or a chalk drawing could be used. Pictures should be used from FM 21-41, pages 128-129 and 134. A practical exercise on protection against a simulated atomic artillery shell or atomic bomb would be desirable.

Period 4, pp. 40-55. The objective of "familiarization" on page 40 and the SOP do not agree. The SOP emphasizes performance decontamination. Memo No. 7 calls for a demonstration of individual decontamination equipment and supplies, but SOP 5 emphasizes performance. This may imply a need to change the teaching procedure as well as the objective to one of performance. Group 2 on Identification and Group 3 on Detection and Decontamination might be combined into one exercise. In admitted ignorance, the project staff questions the doctrine underlying the Station 2 exercise.

Period 5, pp. 46-58. Single-word items should be converted into meaningful sentences. Stations 3 and 4 might be combined unless each can be developed into a practical exercise. A possible substitute for Stations 2 and 3 would be a proficiency test on the MUST skills (patterned after those in the February, 1954, OCAFF tests) and prescribed as a training requirement.

Lesson Plans

Attention was given to the list of lesson plan criteria suggested in TM 21-250, page 30. It was decided, however, to base the analysis upon criteria developed by the project staff including only five of the eighteen suggested in TM 21-250.

Each sample lesson plan was evaluated on the basis of the following questions:

1. Is the goal of this lesson clearly stated?
2. Does it follow the outline in Memo No. 7?
3. Is it easy to read?
4. Are there too many headings?
5. Do they overlap?
6. Are the parts arranged in good learning sequence?
7. Does the plan relate to the goals of this lesson?
8. Can it be covered within the available time?
9. Does it contain practical exercises?
10. Is the material too technical?
11. Is it too theoretical?
12. Is it adapted to the learning ability of the class?
13. Are the key points emphasized?
14. Does it contain illustrations and demonstrations?
15. Does it provide for class participation?
16. Does it add local examples or applications?

A complete set of lesson plans for the 10-hour course, supplied by one basic training center, is reported here to illustrate general observations. The lesson plans at this training center follow Memo No. 7 very closely. The objectives are usually restated verbatim. Most of the plans are in outline form and are easy to follow. In some cases, the paraphrasing in the lesson plan is simpler than in the original. In a number of instances, however, the lesson plan elaborates on the limited outline in Memo No. 7.

As previously mentioned, many topics are treated too theoretically and technically. There is no evidence in the lesson plan of adjustment in content or procedure for trainees with limited learning ability. While there are no specific suggestions for class participation, there is a general reference to the term conference in labeling the lesson. Participation in practical exercises, however, is fully discussed. In general,

there is very little evidence of originality in content or method. The more detailed comments on the lesson plans used at this center follow:

1. Introduction and Mask Drill: Simple, direct outline, but complete and readable. The lesson plan treats the display of equipment more clearly than does Memo No. 7.

2. Smokes and Incendiaries; Nerve Gases and Mask Drill: Satisfactory. Closely follows Memo No. 7. Paraphrasing is sometimes simpler than original.

3. Choking and Miscellaneous Gases: Follows Memo No. 7 closely. It fills out details of topics in the original outline such as initial symptoms.

4. Gas Chamber Exercise and Field Demonstrations: Follows Memo No. 7 almost completely.

5. Protection Against Biological Warfare: Too much factual detail is crowded into this lesson plan. Parts of this plan reproduce paragraphs verbatim from Memo No. 7. Other paragraphs in Memo No. 7 are converted into summaries of essential facts. The instructor's adaptation of the lesson plan should introduce local illustrations and make local applications, and should add practical exercises. The lesson plan contributes nothing to what is already available in the training memorandum.

6. Protection Against Radiological Warfare: This lesson plan elaborates on the skeletal outline in three places but otherwise is an outlined version of Memo No. 7. The film used is an addition not specified in Memo No. 7.

7. Applicatory Exercises and Summary: Parts of this section are converted into a simplified outline but most of it follows Memo No. 7.

The lesson plans for the 10-hour course furnished by the Chemical Corps School do not actually apply to this course. They probably are the plans used to prepare Chemical officers to teach the 10-hour course and other CBR courses. Nevertheless, a comparison with the lesson plans in CBR in basic training was informative.

The lesson plans prepared at the Chemical Corps School are more specific, more up-to-date, and more complete than Memo No. 7. The latest information and the most advanced techniques apparently are made available in the centers with the most highly qualified personnel and the best facilities. The lesson plans should emanate from these centers. They should be periodically revised and circulated Army-wide.

The discrepancies between current and obsolete practice emphasize the need for centrally-prepared lesson plans. For example, a Chemical Corps School lesson plan dated March, 1953, specifies that informative commands (gas, place, check, cover) replace number commands (gas, Two, Three, Four) in protective mask drill. However, one basic training center lesson plan dated nearly a year later still uses the obsolete number commands.

Basic CBR training should be confined to the skills the soldier MUST have (see Section III, p. 52). These skills are of critical importance to the ordinary soldier. The lesson plans should be expertly prepared and closely followed by all instructors. Since most of the lesson plans are not prepared by the individual instructors, there would be no great

loss to them if they followed the lesson plans prepared at one center for Army-wide use.

There still remains, however, the need for encouraging individual study and preparation by every instructor. He can reduce the lesson plan to an outline for his own guidance. He can simplify the presentation, make local applications, add familiar illustrations, introduce appropriate practical exercises, use locally-prepared training aids, adjust to available equipment and supplies, and conform to new directives.

Conduct of Training

OCAFF Training Memorandum No. 7 forms the basis for the 10-hour course in all three basic training centers where intensive study was made. This is one of the few aspects of training operations that were common to all three programs observed.

Subject Schedule of 10-Hour Course

Individual training in CBR warfare is one of forty-one subjects included in eight weeks of basic training. It consumes ten of the 352 hours of formal training at Center A. At this center the course conforms to the five periods specified in Memo No. 7, but the sequence is scheduled in relation to all other subjects and to instructors who also engage in other training activities. The gas chamber exercise is given in the fourth week to precede the week of bivouac training which falls in the sixth week. During bivouac, trainees are given integrated CBR training.

The training periods are scattered between Period 1 (3 hours) in the first week and Periods 4 and 5 (4 hours) in the eighth week, but the

instructors consider this desirable if integrated training is given between periods. They prefer that the Gas Chamber Exercise follow the period on Chemical Agents because it is a logical next step. Introduction, Mask Drill, and Chemical Agents should be given in the first three weeks, not in the fourth and fifth weeks as outlined in Memo No. 7, because the period should precede the 36 hours of rifle training in the fourth week. The instructors and officers contend that ten hours is an adequate allotment of time for CBR warfare, but they also assume that this instruction will be reinforced by integrated and additional later training.

At Training Center B, CBR warfare training is given in the first, second, and third weeks of basic training instead of in the fourth, fifth, and sixth weeks as suggested in Memo No. 7. During the first week, one 2-hour block of time outdoors includes gas mask drill, screening smokes and incendiaries, and protection against BW. On another day in this week, the second 2-hour period includes introduction, nerve gases, choking and miscellaneous gases, and blister gases.

During the second week, a 2-hour period is devoted to RW and a review of Periods 1, 2, and 3. In the third week of training a 4-hour block of time outdoors is spent on gas chamber exercises, identification exercise, CBR defense and decontamination, first aid, and a 20-minute summary of the 10-hour course.

The training officer at Center B explained that limited range facilities and the tight schedule of the 390 hours of schedule training (almost 49 hours per week) require CBR training to be scheduled during the first three

weeks. Officers and enlisted personnel agree that the instruction schedule suggested in Memo No. 7 would be ideal but contend that G-3 could not follow it under local limitations of space and personnel.

At Training Center C, the training SOP for the 10-hour course was being revised during the week of observation. Both the old and the new SOP's were in operation; hence periods in both were observed but neither was seen in its entirety. The new schedule at Center C provides for the ten hours in seven periods which, with a single exception, follow the subject schedule suggested in Memo No. 7.

The schedule of subjects outlined in Memo No. 7 should be re-examined in the light of changes that various training centers have made. Experience with some of these modifications may suggest the desirability of amending the parts of the outline in the memorandum, such as:

1. The gas chamber exercise should follow the study of chemical agents.
2. Introduction, Mask Drill, and Chemical Agents should be given in the first three weeks to precede the 36 hours of rifle training in the fourth week.

Content of 10-Hour Course

At Center A the demonstration and gas mask drill are well conducted. The time devoted to smokes and incendiaries is filled with background information too technical for the trainees. Information on nerve, blister, and choking gases is too complex and is not understood by many of the recruits. This material should be considerably condensed and simplified.

Self aid, first aid, and protective actions are given too little emphasis. At the time of the visit, chlorine was not used in the gas chamber exercise because a safety officer was not present. In Identification of Gases by Odor there is no observable learning. Many trainees smell nothing. There is considerable guessing, and reassurance by the instructor that not all persons interpret odors in the same way. The Detection and Decontamination Station displays a unit CBR equipment or demonstrates decontamination of a small area using bleach.

The hour on biological warfare is filled largely with NICE TO KNOW information, while instruction in radiological warfare (two hours) is too theoretical and difficult to understand. The Applicatory Exercise, "masking under difficult conditions" and "gas treatment stations," provides good practical experiences; but the "BW and RW stations" and "crossing a contaminated area" are completely verbal and contribute little to field proficiency.

The current subject schedule at Center B has obvious weaknesses which could be remedied without major program changes. Starting with the gas mask drill is sound practice. Men are alert and interested. Survival is the motivating factor, and active participation is readily obtained. Logically and psychologically the remainder of the first block of time should be spent in Introduction to CBR Warfare. This is now done by film indoors; whereas mask drill is conducted in the gas chamber area. Introduction could be conducted outdoors with troops moving through smoke areas without masks, under simple sprays constructed by plumbers on the post, or past a safe land mine of MR. A short 10-minute talk on BW--personal hygiene--

should be adequate at this stage of training rather than the 50-minutes allotment in Memo No. 7.

In the second 2-hour block of time interest is at its lowest point in the current sequence. There is little participation, all of it verbal. Special attention must be given to maintaining the interest of the trainee in the protective action he should take under spray and gas attack. Filmstrips showing the proper sequence of actions while under attack and the proper self aid and first aid measures would improve current instruction.

Interest in RW in the third period is good but the content is too technical. More films showing bursts and their effects, and less plot which fools no one, would help. Good sequences could be reproduced from the five or six films now in use to provide such material. Films could concentrate on what to do in an attack. Current films have obvious inaccuracies, such as:

- a. Rubbing in protective ointment with finger
- b. Masking without clearing mask
- c. Leaning rifle against a tree
- d. Showing wrong side of contamination markers
- e. Referring to manuals the men don't have and have almost no chance of seeing.

The third week's schedule is basically good. The gas chamber exercise is the best single unit of training in the 10-hour course at Center B. Detonation and sniffing, still being conducted in February, 1954, is futile. The idea of a gas obstacle course is good but the present one is ineffective and should be improved.

An overwhelming amount of unnecessarily difficult words and phrases is used by instructors. Because most training is by rote, enlisted instructors generally use the same vocabulary they heard at CmlC School, in the 96-hour course, or as they were being "cadre trained" by officers at Center B. In the RW lecture much of the content is not related to protective measures. Soldiers are not concerned with the fact that "a neutron splits the nucleus of a uranium atom" or that "hydrogen atoms fuse." What they need to know is what a burst looks like, sounds like, and does, and then what they should do to protect themselves. It may be that "canned" lectures, possibly on film, will be the only solution to the problems now impeding the learning of proficiencies required in the field.

Content of the CBR warfare course at Center C is similar to that at other basic training centers visited. Being based on Memo No. 7, the lecture periods include the same materials already mentioned as being nonessential, too technical, and not necessary at this training stage.

Training Environment

The physical surroundings at Center A are in fair condition. The acoustics, blackboards, ventilation, and seating appear to be adequate. Lighting indoors is substandard. Outdoor bleachers are satisfactory on a mild day but unsuited for learning in inclement weather. On extremely hot days and uncomfortably cold and rainy days, the teaching center should be moved indoors for lectures and other purely verbal activities.

Six of the ten hours of instruction at Center B are given outdoors near the gas chamber. Training is conducted in this area whether the temperature is 95° or 0° and regardless of precipitation. Planes from a nearby Air Force base clear the area on take-off at heights of 300-500 feet. No amplification equipment is used by the instructors. For periods as long as 10-15 minutes the instructor can say only a few sentences at a time if he is to be heard. Thus, the physical training environment is extremely unsatisfactory. A covered area which is comfortable and free from distracting noises should be made available.

Indoor facilities at Center C—a post theater—are reasonably adequate except for ventilation in summer weather. Inadequate insulation and continuous daily use build up inside temperatures beyond the level conducive to comfort. Outdoors, training is conducted in an area where there is no seating except small logs lying on the ground. This situation could be remedied locally.

Probably the most significant features of the training program at Center C are the clarity and completeness of the CBR Training SOP, and the manner in which responsibilities for training have been outlined. There is a sharp contrast with another training center, not reported herein, where the Chemical Officer has no responsibility for CBR warfare training, where none of his section serves as instructor, and where the training schedule is prepared at Headquarters and is handed down the line to unit instructors who conduct all training. The Center C SOP document is a good illustration of superior administrative competence by a command using a "Division Chemical Committee" for planning, coordinating, and delegating

responsibility to persons of specialized abilities. The command responsibilities are preserved all the way to unit commanders, but the Chemical section is utilized to excellent advantage. The following principles were extracted from the training SOP:

1. The instruction in Individual Protection and Decontamination in CBR warfare as outlined herein will be the responsibility of the Division Chemical Officer.
2. Instruction will be given to groups of company size.
3. Scheduling of instruction periods by units will be coordinated with the Division Chemical Training Branch (Operations Section) at least one (1) week prior to date of instruction.
4. Equipment listed (with the agencies responsible for having it on hand and usable) is not intended to restrict the ingenuity of instructors
5. All unit commanders will be responsible that a gas mask has been issued (one (1) per individual)
6. All gas masks will be properly cleaned by using unit prior to storage.
7. Assistant instructors will be trained and rehearsed in their duties prior to participating in the training. They . . . must aggressively assist the instructor. (Italics added.)

At Center C a CBR training officer holds a weekly in-service training program for the upgrading of his CBR warfare instructors. During this one-hour session a visitor is brought in to discuss interesting background or new developments in CBR warfare. The project staff attended one such meeting at which the post veterinary lectured and led a discussion on tactical aspects of BW.

The Trainees

The recruits at Center A vary from college graduates almost to the illiteracy level in education and intelligence. There is a corresponding range in the understanding of terms, facts, and principles presented in the lecture. The trainees are of the opinion that biological warfare and characteristics of agents are the most difficult subjects to learn.

During the observation period a proficiency test was being given orally to a group of eight illiterate soldiers, but the attitude of the instructors toward grouping for instruction was negative. The officers and enlisted men frown upon any policy of even temporary ability grouping of a company during training, yet they actually practice the principle while testing. They contend that they must do so to accomplish the testing, but in candor they should recognize the same necessity to accomplish some learning that could be tested. The Post Training Officer suggests that the Chemical Officer might experiment with grouping for instruction. The project staff suggests that it be subjected to research Army-wide.

The training schedule at Center B shows that the normal training day for the recruit is from 0730 to 1700 hours. Night problems occasionally last until 2200 hours. All routine policing of equipment and barracks is performed outside these hours. Extra practice periods are sometimes scheduled for specific units. Thus, an exhausted recruit working on K.P. or standing guard duty may get to bed at 2400 hours after cleaning his boots before turning in. He may be routed at 0430 hours the next morning.

He may fall asleep during a CBR lecture; if he manages to keep his eyes open, he may remember nothing of what he hears. The disciplinary, toughening routine in basic training should be separated in time from verbalized training.

Instructors of the 10-Hour Course

With the exception of the master sergeant, the instructors at Center A are college-trained men. On the whole, the quality of instruction is good. The officers talk fluently and are well prepared. They talk without notes and make themselves heard without the use of a microphone. Nearly all the instructors are gentlemen and treat the soldiers in a courteous manner, permitting the trainee to hold his self-respect as an individual and his respect for the instructor. In general, instructor-trainee rapport is good.

The assistant instructors handle subjects well until the questioning gets them beyond their depth. The Army practice of encouraging questions is admirable; but as long as inadequately qualified men are chosen to teach, the practice will continue to multiply misinformation.

The supply and selection of qualified instructors for CBR warfare training is a major problem. Several available qualified instructors—college-trained men with Army teaching experience—are doing routine tasks. The Chemical Officer and one of his able assistants were formerly on the instructional staff of the post chemical school. Since the school has been discontinued, they do no teaching of CBR subjects although, presumably, they are best qualified by training and experience to teach these subjects. (At

another Army establishment the staff Chemical officer and the Chemical section have no training responsibilities but perform their assigned duties in the warehouse "supporting" CBR instruction.) At Center A there is no program on the post in CBR warfare, content, lesson planning, or methods of instruction for officers who are teaching the CBR subjects. All these situations illustrate a waste of instructional resources.

In general, high quality men have been assigned CBR instructor duty at Center B. Half of them are college graduates, but this qualification may be a hindrance rather than a help unless instructor training has instilled in them the need for simplified vocabulary and the spaced repetition of material for many men.

Training Procedures

At Center A approximately six of the ten hours in the course consist of lectures. More practical application of essential information and skill is needed. The technical parts of the course--if they are worth learning--require simple explanation for the slow learners and wider use of training aids.

Usually the smallest group of men present for instruction at any one time at Center B is 200, and in some lecture periods the approximate number is 600. When lecturing it is impossible to show the mask, the identification kit if presented, the M5A1 protective ointment kit, and the like without large scale models or drawings. Cut-away or cross-sectional drawings might help. They should be large enough for visibility at the rear of a group of 600 men and arranged so that the angle of vision from the side does not distort the view.

Transparencies, prepared by the local visual aids section, are used to good advantage. Obvious inaccuracies resulting from the artists' misconception of CBR warfare procedures, such as a soldier supposedly taking cover from an atomic attack but looking up from his prone position to see what is coming, are present in the aids at Center B, as they are at the CmlC School. Color is used to better advantage in the locally-prepared aids, and the ideas presented are usually kept to a minimum. Good transparencies could be used to greater advantage in reviews.

Good use is made of contamination markers. They are available and shown in outdoor exercises, but in the indoor session on RW a transparency is used when actual markers, passed about among the group, would be better. Basic trainees should not be burdened with dimensions of markers.

If training procedures require the presentation of chemical munitions to the men, the trainees should be able to see the pin and release on a chemical grenade, and the striker device for lighting the smoke pot. Large models and mock-ups are necessary for large-mass instruction.

Proficiencies Attained in 10-Hour Course

No tests are used exclusively for the CBR portion of the course at Center A. On the proficiency test given at the end of basic training the six items relating to CBR warfare are not significant and, therefore, are not adequate for evaluating instruction. The test items are only indirectly related to the standards of proficiency. The test results and the analysis of the testing officer show that:

1. The men are still confused about the function of BW.
2. One-third of the men show no familiarity with vomiting gases.
3. About 11 per cent of the men show uncertainties about the function of the gas mask.
4. One-third of the trainees have no comprehension of the radioactive effects of an atom bomb.
5. The best score was made on the item based upon the gas chamber exercise.

Instructors and trainees differ in the importance they attach to the desired proficiencies. Of the twelve listed in Memo No. 7 (making them MUST KNOW), three are considered to be of primary importance; four are considered as SHOULD KNOW proficiencies; and five are considered to be NICE TO KNOW. Instructors assign top priority to masking, self aid, and first aid, and attach least importance to decontamination of person and equipment and the means of support against CBR agents. Conversely, the trainees consider decontamination and the care of individual protective equipment to be of prime importance. Assistants give more emphasis than the instructors to recognition of agents and less to the importance of unit action against CBR attack.

With these different degrees of importance attached to proficiency standards, with the final test being only a verbal gesture toward measuring proficiency attainment, and with no re-training and no follow-up in later training programs, the Army may well be concerned about the effectiveness of basic training in CBR warfare.

Many persons in leadership positions at Center B feel that too much is being attempted in the time allotted. These persons, both

Chemical and nonchemical, appear anxious to develop the basic proficiencies needed for survival and continuance of mission. The proficiency sought most universally is the "basic technique in adjusting, wearing, and maintaining the protective mask." Considerable agreement exists on other proficiencies sought, but only three of the objectives outlined in Memo No. 7 are considered to be MUST KNOW items at this stage of training. There appears to be considerable doubt outside the Chemical Corps that CBR instruction in basic training really stresses the skills that are needed.

The staff observed a special test unit administering a proficiency test to a group of trainees in their last week of basic training. Three of the five CBR items on the test required verbal responses. No evident difference was made in scoring regardless of whether:

1. The man dropped personal equipment, such as gloves, on the ground while masking
2. The mask was cleared
3. The mask was checked for leakage
4. The man remained with rifle between legs, or whether he returned quickly to a "readiness" position

If answers to verbal questions were such that the man seemed to know what he was talking about, a high score was given. Out of five points possible, no one scored less than four during an hour of observation, yet many men would have been casualties of nerve gas.

CBR training operations at Center B, with some excellent features, clearly show the need for a clear, controlling statement of what should be taught; how to teach it simply; what skills must be demonstrated; and what level of skill must be shown by performance.

A copy of the CBR proficiency test in use at Center C reveals that importance is attached at this center to the evaluation of proficiencies. Instead of including five items of CBR warfare among other proficiencies to be tested at the end of basic training, this test is specifically designed for CBR skills. The items, the testing situation, the testing procedures, and the scoring are carefully developed—similar in nature to the OCAFF 1954 tests. There are twenty test items, each describing a specific situation that might occur under CBR warfare conditions.

Testing situations, however, are artificial. Men are assigned to stations and they select cards from an assortment to indicate that they "knew" the correct "action" to take. Thus, whatever score is made can indicate only indirectly the proficiency attained. The testing program at Center C was not observed in operation and test scores were not examined by the project staff.

The varied opinions and practices as well as the deficiencies observed at three training centers indicate a need for the preparation of guides to testing the results of individual CBR training.

Recommendations

1. Objectives of basic individual CBR training should be more clearly stated in terms of proficiencies expected at the end of eight weeks.

2. Every CBR skill that is supposed to be developed as a minimum standard of proficiency should be spelled out in terms of speed, accuracy, sequence of steps or actions, permissible variations in responses, completeness of action, and the like, so that the attainment of aims can be judged.

3. Objectives should not be stated in such ideal terms that there is no possibility of achieving them. "Field identification of war gases" with either the M9A2 kit or the "sniff test" is impractical as a goal of basic CBR training as now conducted. It should be eliminated from the objectives of the 10-hour CBR course as being unattainable at present.

4. Screening smokes and incendiaries should be eliminated from the prescribed content since they are not related to objectives of the 10-hour CBR course.

5. Training Memorandum No. 7 should be redrafted so that it focuses attention only on basic training. Separate publications should be prepared for CBR training at advanced individual and unit levels.

6. The suggested lesson content should be carefully checked for readability. The manuscript should be evaluated by a specialist in readability before publication.

7. The headings as well as the outline should follow a consistent form of indentation which makes it easy to follow the logical sequence of facts. The subheadings should be expanded to give more meaning to the information by clarifying the statements.

8. The theoretical and technical portions of Memorandum No. 7 specified in the body of Section II should be simplified. The use of some of the language, illustrations, and charts in FM 21-41 would help to make the memorandum more understandable.

9. If the local preparation of lesson plans is continued, they should be prepared by the instructors who use them. The content of Memorandum No. 7 should be outlined, not copied verbatim, with practical exercises and local applications being added.

10. More attention should be given in Memorandum No. 7 to the integration of basic CBR training with other basic training. The suggestions which are contained in Annex C are good, but too complex. More specific suggestions are needed which encourage training officers to have men learn to perform duties such as firing a rifle, marching, taking cover, and the like while masked.

11. CBR training procedures in the 10-hour course should require active participation and practice in learning self aid and decontamination just as they are required in mask drill and gas chamber exercise. Specific instructions should identify the way in which CBR practice is to be provided in basic CBR training.

12. A self-scoring or evaluation technique should be developed so that each trainee can check his own proficiency during CBR training. Knowledge of progress should be used as an incentive or stimulus to learning. Positive checks which the individual trainee can make should be used to supplement the observation of an instructor in watching 200 men simultaneously perform a complex action.

13. Greater attention must be given to the physical condition of trainees if they are to learn and remember essential verbal CBR instruction. The influence upon learning of drowsiness and sleepiness, fatigue and exhaustion, climate and distractions, and other factors for which motivation and interest may not compensate should receive special consideration.

14. A workable field identification technique should be devised for the individual soldier. The Chemical Corps should carefully identify

those characteristics (properties, effects) of agents that tell a man what the agent is. These characteristics must discriminate between two agents. All other characteristics should be deleted from basic training: colors, tastes, smells, and the like. A memorization of chemical and physical properties, physiological effects, persistencies, and the like should not be required.

15. The period on BW in the 10-hour course should be revised. Appreciable course time can be saved by limiting BW instruction during basic training to those matters that contribute to field proficiency: personal and field sanitation and hygiene; and these are treated in courses other than CBR warfare.

16. Performance or action tests of CBR proficiency should be given before the end of basic training and should be followed by remedial training scheduled as extra duty for those who are below minimum standards for their stage of training.

17. Safeguards should be established to limit rigidly the formal instruction in the 10-hour course to essentials of behavior, action, and performance. NICE TO KNOW information certainly should be made available to men, but only upon their own time, initiative, interest, and request. Complete lesson manuscripts of what shall be said in lectures may be the best safeguard.

18. The instructors in the 10-hour course should receive direct benefit from the resources of a research, analysis, and curriculum section such as that operated at CMIC School. Continuous experimental study and evaluation of CBR instruction in basic training is lacking and seriously needed.

19. Experimental research should be conducted to determine the effectiveness of grouping trainees for CBR instruction on the basis of intelligence and educational background. Comparative proficiency acquired by control and experimental groups, with indicated adjustments in procedures, should be measured. Ability grouping should reduce the loss in human resources that results from bewildering the slow learner and boring the superior one.

Section III

ADVANCED INDIVIDUAL CBR TRAINING

The purpose of this section is: to identify the objectives of Advanced Individual CBR Training; to identify the CBR skills that are to be developed or practiced during advanced training; to evaluate the clearness with which goals are specified and their attainment is estimated; and to develop recommendations regarding Advanced Individual CBR Training based on observations of training in the Chemical Corps.

The section is organized into five parts. First, the sources of information are listed. Second, the distinct variations that exist in the organization of advanced CBR training for individuals are reported. Next, the section enumerates the objectives of this phase of training as gleaned and summarized from stated objectives—those worded as standards, those suggested by the scope of training, and those that might be inferred from job analyses. Finally, an estimate is made of the possibility of attaining success in Advanced Individual CBR Training without clear specifications of performance skills. Conclusions and recommendations are summarized at the end of the section.

Sources of Information

The following documents were studied as a basis for the appraisal of Advanced Individual CBR Training: OCAFF Training Memorandum No. 7

(31 March 1953); OCAFF ATING-31 352/69 (17 March 1953), Common Subjects Letter; FM 21-40, Defense Against Chemical Attack, pp. 127-128; FM 21-45, Defense Against Biological Warfare, pp. 77-78; FM 21-41, Soldiers Manual for Defense Against CBR Attack (April 1953), p. 17; ATP 3-201, Smoke Generator Company; ATP 3-202, Depot Company; ATP 3-203, Maintenance Company; ATP 3-204, Decontamination Company; ATP 3-205, Processing Company; ATP 3-206, CTSI Detachment; ATP 21-114, Basic Combat Training; Department of Defense, The Armed Forces Officer, pp. 170-171; SR 615-25-15, Military Occupational Specialties; and TM 12-406, Officer Classification. Training operations were observed only in the Chemical Corps--in courses at the School and in troop units at Ft. McClellan.

Variations in the Administration of

Advanced Individual CBR Training

Three procedures are followed in assigning men to Advanced Individual Training after they have completed Basic Training. A soldier may be assigned to a branch training center for eight weeks of additional organized formal training in the particular mission of the branch. Second, he may be assigned to a branch technical school for specialized training. Third, he may be assigned directly to a company unit of the branch, from which assignment he may later be sent to the school to be returned to the unit upon completion of training. In case he is not sent to school from the unit, a cadreman may be detailed to "break in" the newcomer with personal instruction and supervision, and to bring him up to the unit level in post-cycle training.

The general plan of Advanced Individual Training is established in Army Training Program (ATP) 21-114 (OCAFF), which may be followed in detail at the center conducting the second eight weeks of the 24-week training cycle. Training conducted by the branch school is based upon ATP 21-114 but is detailed in a special program of instruction (FOI). Advanced Individual Training carried on within the unit is outlined in the unit's ATP, which details "Common Advanced Individual Training" subjects and "Special Advanced Individual Training" subjects. CBR topics are scheduled among the "technical subjects" in the common advanced training outline.

One purpose of advanced training is to train and qualify the individual in a military specialty. The unit commander may award a military occupational specialty (MOS) rating to a unit-trained man when he considers the man to have attained the necessary proficiency. MOS ratings may also be conferred by the school upon satisfactory completion of the appropriate course. Thus, the program of training in the advanced individual phase may be outlined in a unit's ATP or a school FOI. The success of training (the attainment of proficiency) may be determined by either the personal, subjective judgment of the unit commander, or the established policies of the school.

Governing these variations in the way in which Advanced Individual Training may be carried on, OCAFF policies prescribe CBR training for soldiers in both basic and advanced training, and for units throughout the Army. OCAFF policies also govern the CBR training of individuals in Officer Candidate School, in officer MOS qualifications, and in advanced courses.

The alternative routes along which the soldier may move from basic training to satisfactory proficiency in CBR warfare involve consideration of the following aspects of advanced training in terms of objectives and skills:

1. CBR training of all personnel
2. Officer CBR training
3. MOS training (enlisted)
4. MOS training (officer)

Objectives of Advanced Individual CBR Training

Section II reported the stated and implied objectives for basic CBR training. Memo No. 7 makes no statement regarding similar objectives for advanced training. Since the memorandum enunciates policy for both individual and unit CBR training, it would appear that the goals of basic CBR training are also the objectives of advanced training in CBR warfare. However, several significant statements in the memorandum imply that Advanced Individual CBR Training is just as important as basic training, and that either different skills or more highly developed skills are expected to result from advanced training. Pertinent statements are quoted:

"Advanced training offers less opportunities for use of integrated or concurrent CBR training situations." p. 6.

"Integration of CBR situations in field exercises . . . increases proficiency . . ." p. 3.

"Every appropriate opportunity will be utilized to increase proficiency in CBR protective measures during all training phases . . ." p. 4.

"Annex II contains minimum standards of proficiency . . . for individuals and units." p. 4.

"Proficiency tests will emphasize individual and unit ability to solve practical situations." p. 4.

"CBR situations will be introduced into a subject area . . . only after the fundamentals of that subject area have been assimilated and an initial proficiency has been attained." p. 5.

"Integrated situations will be designed to provide the individual, through experience, with a capability" p. 5.

"Training will be progressive. Basic instruction will be repeated only when individuals . . . are proved to be lacking in fundamental skills." p. 5.

"Tactical subjects which are continued through the advanced individual training phase will include CBR situations on an integrated and progressive basis." p. 6.

"Refresher training (in Post-cycle Training) is not limited to subject matter previously covered but should introduce new CBR situations" p. 6.

"Certain MOS specialist activities are susceptible to hostile CBR action. . . . logical CBR situations (must be) imposed in that training." p. 6.

"CBR instruction in the schools of the arms and services will be conducted in accordance with the provisions of appropriate 'Common Subjects' letters" p. 7.

There can be no doubt that the results of CBR training in the advanced individual phase are expected to be different from those in the basic phase. The absence of stated objectives and training outlines in Memo No. 7, however, requires the identification of aims by indirect methods. Objectives are implied in standards of proficiency, in course or training content (for men and officers), and in job specifications for MOS ratings. If a particular ability or act is judged to be peculiarly and uniquely CBR in nature, it is an objective of CBR training. Any needed CBR skills not identified for basic training, and any skills for which a higher level of proficiency is expected than that developed in basic training are goals of Advanced Individual CBR Training.

Stated Objectives

While some ATP of a branch unit or some course POI in a branch school may contain a statement of CBR training objectives, none was discovered in a search through the CmlC ATP's (the only ones analyzed in the study). The stated training objectives in CmlC ATP's are in such general terms that they would serve another branch equally well. They are worded identically throughout the CmlC series of ATP's, suggesting that they conform to a pattern established by higher authority. They do not include CBR training aims. These deficiencies in CmlC literature are assumed to exist in the other services. The most serious problem is the lack of stated objectives in Army-wide directives and outlines. The need is greater in Advanced Individual Training than in Basic Training, due to the variations in the administration and patterns of training. Proficiencies that are sought uniformly throughout the Army but are developed by different training

organizations certainly require coordination and supervision between the services if attainment of common objectives is to be universal.

Implied Objectives

Skills and the ability to perform duties are goals of training. They may be identified in promulgated standards of proficiency and in MOS qualifications. They are hinted or suggested in training content, assuming that elements in the content of training programs contribute to a definite aim. Standards of proficiency are the only organized pattern of CBR skills and duties that might serve as training goals. The difficulty here, however, is that standards of proficiency identify skills and competence but do not relate them to phases of training. Thus, when Memo No. 7 says that each man must be able to decontaminate "the crew-served weapon of which he is a crew member," it is obvious that basic, advanced individual, and unit training are all involved; but the definition of the training goals of each is not clear, especially in regard to the level of competence expected at the end of basic and advanced individual training phases.

Implied objectives stated as standards of proficiency. The CBR proficiencies of the individual soldier must be distinguished from those skills and duties sought in other military training. The simplest and clearest statement of essential CBR skills was found in FM 21-41, Soldier's Manual for Defense Against CBR Attack, p. 17. Here are stated six items which "Every soldier MUST KNOW." Five of the six involve knowing "how to do" skills. An elaboration of these requirements is found in eight skills identified in FM 21-40, Defense Against Chemical Attack, pp. 127-128.

FM 21-45, Defense Against Biological Warfare, pp. 77-78, adds two more items to the list. Memo No. 7, pp. 67-68, lists twelve standards of CBR proficiency that are to be acquired and maintained by each soldier. All of the individual CBR skills, duties, and practical proficiencies listed in these sources can be classified logically into one or a combination of the six objectives reported in Section II on Basic Individual Training. The conclusion is that emphasis must be upon differences in the degree of skill to be developed in each phase of training. The Army has not specified precisely the level of CBR proficiency that Basic Training must attain and upon which "progressive training" in Advanced Individual Training can be based.

Objectives implied from scope of training. Advanced Individual CBR Training consists primarily of a review of the instruction provided in the 10-hour course with enrichment of the content and with more practice of the skills (Memo No. 7, p. 5). The scope of this training is outlined in ATP's for training within the unit and in POI's for school training programs. Since the Chemical Corps School is the technical service school in CBR matters, an analysis was made of the CmlC School POI's and of the corresponding CmlC ATP's governing training in the units. To the extent that programs in the Chemical Corps (the "3" series) represent a general pattern, it is assumed that the program outline for Advanced Individual CBR Training in units of other branches differs only slightly.

The tabulation of the objectives implied in the content of Advanced Individual CBR Training programs--supposedly for all Army personnel--is

presented in Exhibit C. Those items that appeared in the basic 10-hour course are marked with an asterisk (*). Items not so marked probably represent new CBR material to be learned. It appears that each soldier is expected to learn or improve his skills in the following duties during his advanced training:

EXHIBIT C

Aims Implied from Scope of Advanced Individual CBR Training

I. RECOGNITION

1. The classification of chemical agents--toxic, nontoxic, persistent, nonpersistent, Chemical Corps symbols for (touched upon earlier)
2. The capabilities and limitations of chemical agents in warfare (touched upon earlier)
- * 3. The effects of chemical agents which aid in identification
- * 4. The nature of BW and its effects
- * 5. The capabilities and limitations of atomic warfare
6. The effect of radiation on man (touched upon earlier)
- * 7. Standard markers for contaminated areas and alarm systems
8. Identification of agents
 - *Chemical
 - Biological
 - Radiological
- * 9. Duties of Monitors--CBR personnel

II. PROTECTION

- *10. Masking properly--adjusting, wearing
11. Inspection and repair of masks
12. Protective clothing (only mentioned in earlier training)
- *13. Field sanitation
14. Collective protection devices and gas-proofing
15. Effectiveness of protective equipment
- *16. Individual and unit protective means and measures

III. SELF AID, FIRST AID

- *1. Self aid and first aid available to individual and unit--methods and techniques

IV. DECONTAMINATION

- *18. Of person
- 19. Of unit equipment—training to team level

V. EXPLOITATION

- *20. Proper action on alarm—defense organization within units
- 21. Reporting CBR attacks to adjacent units and higher authority
- 22. For officers and noncoms, tactics and command aspects of CBR operation

VI. OTHER

- 23. Organization and mission of Chemical Corps units

Specialist Training Courses (Officers). Also outlined in the Common Subjects Letter, OCAFF ATING-31 352/69 (17 March 1953) are officer courses. This document details the list of common subjects and their scope for courses in Officer Candidate School, Branch Company Officers' courses and associate courses; and courses conducted at the Army War College, Command and General Staff College, and special courses.

No statement of CBR skills or proficiencies to be developed in these courses was found. In addition to the skills required of the individual soldier, these are implied in the objective and scope of training in Officer Candidate School:

- 1. Ability to act as a CBR trainer at platoon level
- 2. Ability to meet CBR warfare problems at platoon level
- 3. Knowledge of use of tactical and collective protection by individuals and small units
- 4. Understanding of unit organization for CBR defense
- 5. Knowledge of detection methods and devices
- 6. Knowledge of field expedients for decontamination
- 7. Understanding of tactical employment, means of dissemination, terrain and weather conditions, and troop dispositions
- 8. Description of atomic explosions
- 9. Knowledge of effects, and proper individual actions
- 10. Knowledge of unit protection and unit SOP in atomic warfare

In the Branch Company Officers' Course, the only additions to the previously defined proficiencies apparently are general understandings or knowledge of:

1. Unit SOP for CBR defense
2. Use of unit CBR specialists
3. Tactical employment on offense and defense and unit action to exploit friendly use of CBR agents
4. Methods of delivery and general concept of tactical targets in atomic warfare

A careful examination of the CBR skills inferred from officer training programs reveals no performance requirements beyond those expected of enlisted personnel. Indeed, the knowledge and understanding which the officer courses seek to develop are more a phase of the leadership and supervision function than they are of CBR proficiency.

Judging from the literature examined, in terms of official statements of objectives, scope, and hours of instruction, the CBR training given all soldiers will suffice for officer personnel in (a) developing performance skill, and (b) providing a basis for the execution of officer responsibilities. This conclusion is reinforced by the statement that, for the officer, "It is obviously absurd to expect that any officer could know more about radio repair than his repairman, more about mapping than his cartographical section, more about moving parts than a gunsmith The distinction lies in the difference between the power to do a thing well and that of being able to judge when it is well done."¹

1. Department of Defense, The Armed Forces Officer, Washington: Government Printing Office, 1950, pp. 170-71.

CBR Objectives Implied in Job Analyses

MOS Training (Enlisted). An ATP is intended to qualify a man in an MOS during the advanced individual training stage. Specifications for Advanced Individual Training provide for "school trained specialists" and "unit trained specialists" who acquire the same MOS ratings.

For an enumeration of the CBR skills involved in MOS qualification, an examination was made of SR 615-25-15, Military Occupational Specialties, and a detailed list of CBR duties was compiled from job analyses of the following: MOS 1809, Decontamination Supervisor; MOS 1786, Chief Cml Supply Specialist; MOS 1328, Chief Cml Laboratory Technician; MOS 1142, Gas Mask Repair Supervisor; MOS 1140, Impregnation Supervisor; MOS 1731, Smoke Generator Supervisor; and MOS 1870, Cml Staff Specialist.

MOS Training (Officers). A similar compilation of CBR duties of officers was made from TM 12-406, Officer Classification, for these six MOS groups: 1414, Decon Unit Cdr; 1415, Smoke Generator Unit Cdr; 4500, Cml Supply Officer; 4832, Cml Processing Officer; 4841, Cml Maintenance Officer; and 7314, Chemical Officer.

Apparently, it is Army policy that a person's grade or rank indicates the level of responsibility he is qualified to assume. The tabulations of MOS duties identified types of skills and duties rather than levels of understanding and knowledge. One conspicuous feature of the CBR skills of officers is the emphasis on tactical operations rather than technical--the offensive rather than the defensive aspects of CBR skills. It seems obvious that the Army has the same CBR objectives for officers as for enlisted personnel, and that the higher degree of skills and the

change in emphasis from defense to offense are functions of command responsibility instead of CBR warfare competence. Thus, the CBR objectives inferred from MOS qualifications parallel those implied from scope of training. No other source was found to suggest additional objectives of Advanced Individual CBR Training.

The project staff believes that every CBR skill and duty imposed upon officers and men by the official literature can be classified under one or more of the following objectives of Advanced Individual Training:

All Personnel

1. Recognize CBR attack
2. Detect and Identify Agents
3. Maintain and Use Protective Means
4. Use Proper Self Aid and First Aid
5. Decontaminate
6. Execute SOP

Officers and Noncoms

7. Supervise Training
8. Operate and Maintain CBR Equipment
9. Apply Tactical and Intelligence Data
10. Administer Safety and Protection
11. Administer Supply and Materiel
12. Direct Use of Specialist Personnel

The Conduct of Training

Most of the project staff observations of Advanced Individual Training were made in Chemical Corps programs. General comments on training operations

are not reported here because a detailed report on CmlC Unit Training is presented in Section IV and a report on CmlC School Training is given in Section V.

Training Success Uncertain Without Clear Objectives

The identity of CBR skills expected at the end of eight weeks of Advanced Individual Training appears in several places in the literature, but in the documents or statements that should give the clearest definition of aims there is a strange lack of guidance. The ATP's and POI's in the "3" series define neither CBR objectives nor standards of competence. Those who conduct Advanced Individual Training are given a course outline and schedule to follow which contains no guiding policy as to specific goals or any criteria to use in determining the level of competence to be reached; yet Memo No. 7 (p. 5) plainly speaks of "fundamentals" being assimilated and "initial proficiency" being attained.

In Officer Candidate School the implied proficiencies are general in nature and cannot be developed into performance skills during a part of ten hours of instruction. The required field proficiencies might be realized if there is enough integration of CBR instruction "into appropriate school problems" after the ten hours; but there is no criterion or guide for the amount of practical exercises needed. It seems unreasonable to expect or hope that the portion of ten hours allocated to CBR proficiencies can possibly reach a level "to prepare the student to act as a trainer and to meet the problems of CBR warfare at the platoon level."

The common subjects outline mentions neither CBR objectives nor CBR proficiencies as such for the Branch Company Officers' Course. A review

of some topics from the 10-hour course and some from the OCS course is stipulated. Again, the only hope of developing any performance skill and field proficiency in individuals during this training stage is directly dependent upon the practice actually experienced in the integration of subjects and exercises after the twenty hours in the regular course or the ten hours in the associate course. If a nonchemical branch officer says that all necessary CBR skills can be taught on the way to and from the rifle range, there is little information in training outlines to offset this point of view or to belie the statement.

Lack of Agreement on Required
Levels of CBR Proficiency

The CBR skills and duties tabulated in this section appear to represent three levels of complexity. Advanced Individual CBR Training may develop in the trainee the simple performance or motor skills that result from drill and practice, with a minimum background of understanding and knowledge. Masking is such a performance skill. This level of attainment may represent the job requirements of the basic trainee and E-1 grade of soldier.

A higher order of performance may result from advanced training, accompanied by a level of knowledge and understanding that will enable one to supervise and demonstrate the more simple performances. This level of attainment is illustrated by many of the MOS specifications.

The highest degree of competence and proficiency that may result from advanced training would appear to qualify one to perform technical skills, to plan and execute tactical and technical operations, and to exercise judgment in the performance of CBR functions. Beyond this degree of proficiency,

advanced training seems intended to increase skill in command and leadership functions rather than in CBR duties.

The project staff assumed that degrees of proficiency in the exercise of CBR skills and duties should vary between enlisted men and officers, between Chemical and nonchemical officers. It also assumed that the complexity of the skills and the level of understandings and knowledge should increase with the grade and rank of both enlisted and officer personnel.

The analysis of training program outlines tends to substantiate the latter assumption, but no evidence was available to support the former. No forthright, positive official statement was found to validate either assumption. Interviews with numerous officers revealed extreme variations and conflicts in points of view, even among officers holding the same MOS. In the absence of policy or directives, each person responsible for conducting Advanced Individual CBR Training can make his own interpretation regarding the level of skill his training operations are supposed to develop.

Since no mention is made of specialized skill in self-aid and first-aid techniques for Officer MOS 1414, Chemical Decontaminating Unit Commander, it can only be inferred that an "intermediate" level of competence will suffice for this duty. Such an inference seems unwarranted in view of the likely exposure of his unit to agents that have been released and to CBR contamination in field operations, but the official job analysis appears not to recognize this point. However, it is highly probable that a School-trained or unit-trained MOS 1731 will develop a higher order of proficiency in the use of protective measures than a nonchemical MOS of equal grade.

This estimate of proficiency levels of CBR skills and duties shows beyond question that Army directives governing CBR training might be followed to the letter without reaching the level of proficiency required in the field, depending almost wholly upon the judgment of commanders responsible for training. If there is an Army commander in any branch who minimizes the likelihood or importance of CBR warfare and the need for CBR training, it is certain that job specifications and standards of proficiency are not detailed enough to insure that men trained under him will achieve an adequate standard of proficiency. It is not enough to infer that Officer MOS 1414 requires as much skill in self aid and first aid as a graduate of OCS, for the skill required of the latter was itself inferred from the Memo No. 7 requirement of this skill for the recruit in basic training.

The project staff is certain that the success of training in Advanced Individual CBR Training cannot be "standardized" at a satisfactory minimum level with the almost unlimited discretion allowed each instructor in the identification of aims, determination of procedures, and judgment as to the proficiency levels sought. A critical study of OCAFF CBR Proficiency Test results at the unit or company level in different branches should reveal excessive variations in CBR competence.

Conclusions Regarding Advanced Individual CBR Training

The study of training policies, program outlines, proficiency standards, and job classifications, and the observations of training described in Section IV leads to the following generalizations:

1. Advanced Individual Training generally follows a pattern, regardless of the type of unit into which the individual will go.

2. There are slight differences in Advanced Individual Training in CBR as prescribed in the ATP's of the "3" Series. In ATP 3-201 (Chemical Smoke Generator Company), for instance, the pattern of six hours of defense against CW attack, three hours of defense against RW attack, and one hour of defense against BW attack as prescribed in other ATP's is not followed. Instead, ATP 3-201 prescribes a pattern of three hours for each area. The staff must assume that these differences were planned to accomplish specific purposes, but it is difficult to see why a smoke generator operator needs to know more about BW than does a member of a processing company or a decontamination company. The reason for the differences may be that at unit training levels the processing company and decontamination company have additional training in BW while the smoke generator company does not.

3. Many if not most of the differences in Advanced Individual Training in CBR may have resulted from the lack of a careful analysis of the tasks each individual is expected to perform. It appears likely that the programs have more or less grown up like Topsy. Otherwise, the prescribed program would be largely field exercises utilizing live or simulated agents and problems which would require individuals to develop and demonstrate proficiencies in the presence of CBR agents.

4. Since it appears that, in the unit, Advanced Individual Training is generally provided by cadre personnel, it is probable that the quality of the training experiences which are provided may actually be lower than the initial training provided in the 10-hour courses in basic training. Project

staff observations in the field confirm this hypothesis. Whether or not it is true depends almost entirely upon the training competence available in the cadre. If the commissioned and noncommissioned officers comprising the cadre are capable teachers, and if they have had good training experiences themselves in CBR warfare, then advanced individual training probably is good. If, on the other hand, cadre personnel have never before had any responsibility for or interest in training, and if their own CBR training consisted primarily of listening to lectures and sleeping through films, then the training provided is not likely to be of high quality.

5. The outline of prescribed training does not provide guidance needed by cadre personnel concerning the type of experiences that should be provided. Only the barest outline of scope to be covered, references to be used, and training aids available is provided.

6. Standards of proficiency for individuals at the conclusion of this phase of training have not been provided in the ATP's and ATT's. Unless stated elsewhere in a source not known to the staff, such an omission renders hopeless the attainment of uniform proficiency standards on an Army-wide basis. It appears necessary to infer them from ATT's. This cannot be done with consistent results.

Recommendations

1. A general classification test to determine the achievement level should be devised for use at the beginning of Advanced Individual Training. It should be applied at the next duty station following basic training at the beginning of the new training program. Training officers in the unit or

in the service school should have the knowledge of "where the man is" in CBR in order to make his training progressive.

2. Every ATP should define as its objectives those specification of behavior skills the course is intended to develop. If men are supposed to learn to identify in the field colorless phosgene by its invisible appearance or to detect a "faint odor, if any," by its smell, the ATP should say so.

3. Every ATP should define the minimum standards of proficiency expected for each objective established. These standards should be formulated as standards by detailing the specifications. If every man is expected to detect a blister agent, sound the alarm, mask, rinse, blot, apply ointment, and be on his way within 60 seconds or 3 minutes or 10 minutes, the standard of proficiency should be established in the ATP.

4. If there are any differences in the levels of skill in CBR field proficiencies among Army MOS's, the ATP's should identify these different levels in their objectives, their standards of proficiency, their course content, their time allotment, and their ATT's. If different levels of CBR knowledge and understandings, as well as of performance skills, are needed by different grades and ranks of personnel, training policy should spell them out for all to understand. If not, then the variations now outlined in courses and programs for officers and men should be restricted.

5. The program should be carefully outlined as to scope—the broad statements now contained in ATP's permit so much interpretation that the adequacy of the program depends primarily upon the quality of the commissioned and noncommissioned officers in the cadre. To some extent this will always be true, but more effective guides can be provided for them.

6. The period of advanced individual training should be a time primarily for the development of individual proficiencies to a high level through actual field exercises with CBR agents or simulants. Most of the time should be spent in integrated training rather than a minor portion of it.

7. There must be positive means of identifying and measuring "fundamentals" and "basic skills" and "initial proficiencies" for each trainee before "training will be progressive" and "basic instruction will be repeated." Such means should be imposed Army-wide upon all phases of advanced training.

8. Lectures should be almost eliminated from the program. Much of the teaching should be followed by field exercises, with the barest briefing in advance, so that the individual will be forced to rely on his own knowledge and that of his buddy. The problems presented should be real enough to require earnest overt responses from the individual, and the critiques following exercises should emphasize behavior.

9. Short films should be developed for use prior to a field exercise if facilities can be made available in the area. Sufficient varieties of films and problems should be developed to subject the individuals to CBR attacks of the major types envisioned. Attacking through contaminated areas of their own making should be included also. The emphasis should be placed on direct, firsthand experiences rather than talked-about and listened-to experiences. Decontamination should be learned by decontaminating, taking cover by taking cover, washing out the eye by washing it, blotting off a probable blister agent by blotting it off in the field. When a simulated

blister agent contaminates the eye, a simulated BAL ointment which works without damage to the eye should be used.

10. A separate publication resembling Memo No. 7 should be prepared for Advanced Individual CBR Training. Directives should be in detail so as to leave no doubts as to specific objectives, increases in level of proficiency, measures of satisfactory progress, desirable integrated practice, etc.

11. Central supervision should be established to coordinate and upgrade the program and quality of instruction during this second phase of CBR training. This phase probably is the most crucial for individual CBR proficiency.

Section IV

CHEMICAL CORPS UNIT CBR TRAINING

This section is an analysis of Chemical Corps unit training. It begins with an enumeration of unit CBR warfare skills and duties as gleaned from Memo No. 7, and a critical analysis of CBR warfare objectives for Chemical Corps unit training. The conduct of training is then examined, including the attainment of proficiencies. The section closes with a summary of recommendations.

Sources of Information

The sources already listed in Section II and Section III were used as background information for the study, with CmlC ATP's serving as official descriptions of the courses of study. These sources were supplemented by interviews with instructors, staff, and men in the units, and by written responses from instructors and trainees on questions submitted by the project staff.

Objectives of Unit CBR Training

Memo No. 7, pp. 68-70, outlines unit standards of CBR proficiency for all Army units. One requirement for proficient action when under attack in CBR warfare is that "the unit must have the prescribed complement of CBR personnel." This would indicate that specialized CBR skills are supposed to be possessed by certain designated members of the unit.

However, changes in policy made during the course of this project lead to the following conclusions:

1. First, the 96-hour course for training CBR specialists was abolished.
2. The CmlC School then assumed the job of specialist training in CBR warfare, returning trained personnel to their unit after completion of a school course.
3. Later, the designation of "CBR specialists" within units was abandoned by a directive which made everyone responsible for being competent in CBR warfare.

The CmlC School still serves as the training center for this latest policy, subject to command decisions that specialized training is needed within the unit. Apparently it is left to the discretion of the unit commander as to whether CBR warfare proficiency can be developed within the unit to a level that satisfies him; or whether he sends selected members of the unit to CmlC School, to bring back to the unit a higher level of ability in CBR warfare. His guidance in the exercise of this judgment relies heavily upon the unit standards of proficiency in CBR warfare described in the Operation portion of Memo No. 7 as follows:

The unit must be able to continue its mission during enemy CBR attack and must conduct itself in a manner which will minimize loss of operating efficiency or interference with the unit mission. This capability requires continued effective operations with minimum loss in time, personnel, or materiel.

1. The unit must be able to:
 - a. Decontaminate unit equipment
 - b. Cross, avoid, or function in contaminated areas
 - c. Take proper action under aircraft spray attack
 - d. Take proper action on signal by local alarm system, as prescribed by unit SOP
 - e. Determine the agent used (i.e., type of gas, existence of radiation hazard)

2. The unit must:
 - a. Maintain a high order of unit and personal sanitation to minimize vulnerability to biological attack
 - b. Follow sound procedures for individual and unit protection during an atomic missile detonation under conditions of air, surface, and subsurface burst
 - c. Make proper adjustment in its operation based on the variation in radiological hazard associated with different types of atomic burst
 - d. Follow accepted operational procedures during friendly atomic missile fire support
 - e. Establish effective intelligence procedures covering reporting of CBR attacks to higher and adjacent units

Fundamentally, the five "abilities" prescribed for the unit are the same as those required for each soldier: decontaminate unit equipment; avoid or cross contaminated areas; take proper cover under spray attack; explicit SOP on signal; and identify agent(s) used. The need for unit and personal sanitary practices, and for proper unit and individual procedures under atomic attack, whether enemy or friendly, might have been included in the "abilities" of the unit. The two remaining requirements, making adjustments in operations and establishing effective intelligence reports, are command or leadership duties performed with a thorough knowledge of CBR warfare.

Unit proficiency or skill is essentially the composite of skills of the individuals in the unit. While an army unit operates as a team, the team training consists chiefly of training individuals for their team assignments, and then giving them experience in practicing together. There is only an artificial line of demarcation between Advanced Individual Training and the training of the individual in his team assignment. A soldier who is receiving his MOS training in the unit (Section III) is simultaneously engaging in phases of unit training.

Aims and objectives for Chemical troop units are not clearly stated in Army ATP's except in general terms, such as:

1. To develop a military unit that is composed of individuals habituated to military life; adjusted to working together as a team in the furtherance of a unit or combined mission; and capable of meeting the requirements established for a well-integrated, efficiently functioning Army organization.
2. To develop a technically-trained unit that can operate in the field efficiently to discharge its basic mission.

Since troop unit training is outlined in the same ATP's as advanced individual training, most of the observations made concerning advanced individual training are generally applicable to troop unit training.

An analysis of troop unit duties and CBR warfare objectives for Chemical troop units, as implied from scope outlined in the ATP's of the "3" series, leads to the following generalizations:

1. A considerable block of time is allotted in most troop unit training to review and/or teach again the characteristics, limitations, capabilities, and employment of CBR agents in warfare. (Usually six hours.)
2. Detection is included in the preceding block of time except for Maintenance and Processing Companies. Detection in ATP 3-203 and ATP 3-205 is omitted, although it is a MUST item for all soldiers.
3. Generally, no mention is made of alarms, standard marking signs, or methods of delivery at the troop unit level of training. (One exception: CTSID unit has a considerable block of time on munitions.)
4. It is evidently assumed that every soldier has by this time developed proficiency in masking since no specific mention is made of it. Mention is made of individual and unit protective means and measures which, of

course, include masking; but this is the first level of training where the protective mask is not specifically singled out for emphasis.

5. Self-aid and first-aid techniques for chemical casualties are given considerable emphasis (except in ATP 3-201, where they are omitted).

6. Decontamination of equipment is given a substantial block of time (four hours) with the explanation that previous individual training should be extended to team levels, with every individual understanding his duties under the unit SOP.

7. Extra allotments of time (and therefore emphasis) are given to decontamination in the ATP's for the decontamination company, the processing company, and the intelligence unit.

8. Exploitation is generally omitted from the ATP's. Considerable attention should be directed to the adjustment of operations under certain conditions. Perhaps the time allotted to "field training" or "field exercises" is supposed to provide sufficient practice, but a study of the ATP's does not show that the Decontamination Company learns to operate without normal equipment, or that the Processing Company learns to operate while under gas attack on its rear area position.

9. The great majority of the time allotted for Troop Unit Training is blocked out for Field Training--actual operation or functioning of the unit. It is apparent that the objectives of training at this level are to provide a situation which approximates that which the unit will face in the field so that each man will perform his duties without hesitancy and with competence.

10. A great deal of training at this level is allotted to maintenance of basic combat skills, supply and logistics information, and similar concerns, but not to CBR warfare as a basic problem.

The Conduct of Training in CalC Units

A soldier is supposed to achieve CBR combat readiness during unit training. At this stage in his development he should have learned the basic or fundamental skills in CBR warfare. The practical application of these skills to his duty in the unit should be neither difficult nor complex if basic and advanced CBR training have been successful.

Trainees

When a man completes basic training and joins the unit to which he is assigned, his training problems are entirely different. Theoretically, he is assigned to a unit for which he is suited in background and abilities.

The trainee has had enough of Army life to have made some adjustment to the tensions and stresses that interfered with learning during basic training. Endurance, discipline, and stamina have been developed but routine in the training phase now requires less of this physical conditioning. Time pressure is relieved to some degree. The man has a "permanent" home, and he has joined those with whom he will live, possibly for the remainder of his Army service. There is more time to read or relax, or time to study should he be so inclined. Emotionally, he is more capable of learning in unit training than he was in basic training.

Instructors

Unit ATP's provide a block of time during which the cadre undergoes training and preparation for receiving new personnel into the unit. For the most part, CmlC unit officers are young men whose college background included chemistry or some allied technical field. The officers are not assigned to the unit primarily on the basis of training competence, background, or preparation as instructors. Most of the training operations appear to be conducted by the noncommissioned officers in the unit. They represent a wider variety of qualifications than was found among their officers, ranging from master's degrees in chemical engineering to an educational level below high school graduation.

Many trainees who have advanced beyond the level of basic training have not mastered the basic skills in CBR warfare. Reports from both trainees and instructors clearly indicate the need for unit instructors who can and will make CBR understandable to uneducated men. Familiarity with subject matter should not be the sole criterion for selecting instructors. Instructors should be chosen on the basis of their ability to achieve the objectives of unit training.

Training Procedures

The individual learns the operational tasks being conducted by the unit through actual on-the-job training. For example, a man is assigned to a Maintenance Company, T/OG E 3-47A, supposedly on the grounds that he has some mechanical ability or manual dexterity. If he has considerable ability, he may be assigned to a section where he learns to maintain smoke generators by overhauling and repairing them. If he has less mechanical

ability and interest, he may be assigned to a section in gas mask repair where he learns his MOS by dismantling, testing, repairing, and reassembling gas masks. Similar practical experiences are afforded in other types of CalC units.

The theory of on-the-job training in the ATP is sound. Applied to CBR warfare, however, it would mean the repair of a smoke generator out in the woods rather than in the shop, the repair of gas masks while wearing gas masks, and the like. Possibly more use of harassing agents during "shop" operations would force practice in job performance while masked without involving the greater hazards of CBR warfare play in bivouac with the more important but dangerous agents.

Stages of training. There is a need for the sequential arrangement of skills to be learned. It appears from observation that a man joining his unit in some phase of advanced unit training or post-cycle training may develop proficiencies in the operational aspects to a fairly high level without receiving any training in CBR warfare. He may develop skill in one duty of his MOS before receiving any training in another duty. The unit commander's judgment determines when the remainder of the fundamental skills should be learned by the new man—in School, in taking the entire unit into an ATP cycle of training, or in individual tutoring by an instructor in the cadre.

Because of the different stages of training achieved by the men and the "job" type of skills to be learned, practices in vocational schools should be used with success in troop unit training. The staff observed an oilcloth pictorial tool chart being used to check the standardized

contents of a tool box. Nowhere was this basic plan observed in checking the stage of training or the rate of progress of a trainee; nor was there found a "job sheet" showing the trainee a breakdown of the component elements or steps in a specific skill or job.

In aviation training such guides are considered essential in teaching cockpit checks. They are also valuable in training carburetor overhaul, propeller overhaul, and the like. Moreover, the trainee is not advanced in his schedule until he has been given an "up check" on all phases of any particular stage of training. CmlC unit ATP's might profitably adapt this practice to many of the highly important skills being taught and to the MOS certification of men.

Unit training officers and noncoms should be given guidance in the preparation of job analyses, job sheets, check-off lists, and performance standards for each skill a man is taught. Progress charts for each man should be maintained.

Not all ATP training involves trainee activity. A battalion decontamination exercise was followed by a one-hour lecture on Map Reading, Direction and Azimuth. Typical of CBR lectures--with blackboard and chalk but no compass, no large scale compass rose, no cut-outs of angles, and no map to read--the officer frequently interspersed his teaching with "Don't let this confuse you" (but it did), "Of course you all know" (which they didn't), and "Superimpose the azimuth angle on the grid angle" (a mental gymnastic not all trainees can take). The result was confusion!

An exercise should be developed for unit training to integrate map reading and CBR training. It could be based on a map of familiar territory

at Ft. McClellan and patterned along the lines of the exercise being used by the Navy Unit at CmlC School. However, the problem should be simplified and capable of a correct, satisfactory solution by the trainees. Having gained a concept of spaces involved, trainees then should have actual practice in locating "planted" radioactive material and measuring its intensity, in detection and identification of contaminated areas, decontamination, and the like.

Interruption and losses of personnel. Numerous interruptions interfere with the training schedules of the troop units. However important it may be for the unit to support other training activities—the preparation for inspections, the policing of areas, or the organization of a color guard—all such interruptions inevitably delay the attainment of training goals. The extent to which such interruptions are justified is not a decision which rests with the project staff; but their existence should be recognized as a problem in unit training in CBR warfare.

Unit capability is lowered when a levy against the unit removes a well-trained, skilled member. The project staff would not presume to question either the justification or the frequency of such losses. It merely observes that the training problem in CBR warfare is influenced directly and adversely by the practice.

Problems having similar effects are rotation of duty for individuals rather than units; and the short span of time which a specialist, following his School specialized training, spends in the unit prior to discharge.

Difficulty of CBR Content in Unit Training

Men in CmlC unit training were asked to report which CBR topics were easiest for them to learn and why; which were the hardest to learn and why; and what they could suggest in the way of training aids to make learning easier. Usable replies were received from 72 men in a sampling drawn from six types of Chemical units.

Trainees' statements of topic difficulty. The easiest skill to learn is gas mask proficiency, being so reported by more men than all others combined. Several different explanations were suggested, with firsthand experience with a live agent in the gas chamber being mentioned most frequently. Personal experiences probably gave the men an adequate minimum proficiency in masking, plus an appreciation for the mask.

The next most frequently mentioned "easy" skill was First Aid M5A1 Kit. Although reported as easy to learn by men in several companies, the frequency of mention of this topic was conspicuous in one unit. The explanation was that in class each man had experienced two drops of live mustard on the arm, one of which was decontaminated and the other merely blotted.

Several topics were identified as the "most difficult." Radiation, BW, and RW were mentioned by 25 per cent; identification and the M9A2 kit were mentioned by 25 per cent; odors by 23 per cent; and names, symbols, and markings of agents by 20 per cent.

Instructors' statements regarding topic difficulty. Seventeen CBR instructors in the reporting units responded to comparable questions concerning their success and difficulty in "putting CBR over to their men." Fifty

per cent of the "easy-to-teach" topics reported were Mask Drill and Gas Chamber Exercise. Identification of CW Agents appeared in 20 per cent of the reports. None of the five other topics were mentioned more than once.

Items related to BW and RW constituted 44 per cent of the "most difficult" topics to teach. In this category, BW appeared twice: once as being boring to men when limited to "unclassified" information, and again as "not enough time allocated to BW." Radiac instruments and intensity measurement comprised about one-fourth of the BW-RW troubles. "Teaching the structure of the A-Bomb" appeared once as being "generally too deep for the average soldier to understand."

Symptoms, self aid, and effects of chemical agents were mentioned by 22 per cent as being difficult topics. Personal decontamination, closely related to these topics, was mentioned twice. Identification and the M9A2 kit were mentioned by 15 per cent. Two of the instructors considered teaching terms and definitions as being most difficult.

It is clearly evident that both instructors and trainees have reached a state of "readiness" to move beyond the level of basic training skills and are ready for more complex knowledge; and it is also clear that men in the units are ready for a different kind of training experience with the basic CBR skills.

Unit commanders must not assume that men coming to the unit have adequate CBR background. They may safely assume that the men have matured and have become somewhat adapted to Army procedures. When they and their instructors express the need for experience with agents, the experience should be given them.

There is evidence in these responses also to the effect that CBR content in unit and advanced individual training must be sifted to remove the material that has no possible value in the field. Formulae of chemical agents, chemical names of chemical agents, atom bomb construction, and other technical content are useless obstacles to the trainee who commented, "I can't get renton and milimeter separate enough to understand it."

Personnel point to learning improvements. In response to questioning, the men suggested several ways as to how learning could be made more efficient. Their comments fall into the following major categories:

1. More practical experience in learning (live agents, syrette injections, M9A2 drills, etc.)
2. More time on difficult topics (BW, RW, M9A2, Geiger counter, etc.)
3. Greater instructor efficiency (knowledge of subject, interest and enthusiasm, techniques, etc.)
4. Improved training program (too many subjects in one day; make C, E, and R separate; teach intensity formulas only to select students; schedule difficult topics in early morning; handouts to study when off duty; etc.)
5. Changes in personnel policies (work primarily in area of MOS, use as instructors those who want to be in CmlC, etc.)

The two most frequent suggestions for the improvement of learning made by instructors are: use more field work in teaching CBR, and use live agents.

Attainment of Proficiencies

Army Training Tests have been prepared to accompany ATP's. Basically, the ATT is designed to elicit a verbal response describing an action that should be taken in a field situation, which is also described verbally. Thus, at the end of a training period involving on-the-job learning and performance, the test of accomplishment measures the verbalization of knowledge about a skill. If an analogy may be drawn, the man at the end of his ATP resembles the golfer who sits in the locker room and describes how to drive a ball 250 yards or how to sink his 30 foot putt on the fourteenth green. A soldier who can "talk a good game" of CBR warfare may show up well on this phase of the ATT, while another who can "play a good game" but can't "talk it" would not show up so well.

Officers and noncoms in charge of unit training programs were questioned rather closely on the validity of their estimates of proficiency of men and the unit. The attainment of an MOS rating should indicate the attainment of proficiency. In brief, the staff understands that the man is certified for his MOS when, "in the judgment of his unit officer," he has qualified himself. Nowhere has the staff found any objective basis for this evaluation. Similarly, the elements that constitute proficiency—whether in identifying captured chemical agents or in repairing a smoke generator—are neither identified nor measured objectively.

SR 220-80-5 (19 April 1954) says in Section II 6b that "The commander concerned will determine the degree of specialized training necessary." Section I-4 says, "The commander is responsible for the readiness of his unit to participate in CBR warfare." The military knows better than any

other profession the vital necessity for assigning responsibility and commensurate authority to discharge it. Just as necessary is the principle that every individual is entitled to know what his job specifications are and the criteria by which he is to judge or be judged. CBR warfare training in the Army does not satisfy this principle in the judgment of the project staff.

In joint operations, whether with the Air Force or merely with a Smoke Generator Company preparing protective clothing for a Decontamination Company, there must be a common interpretation of "readiness," "effectiveness," "capability," and "proficiency" as these terms are used to define responsibility for CBR warfare training. There is no common interpretation; it is left up to each unit commander for his unit. Criteria for these abstract measures of attainment should be spelled out for the guidance of all without infringement upon the command prerogatives of any unit commander.

The sergeant in the Processing Company knows he must process a certain number of pounds of clothing per month, but he also knows that quality of the product, neatness of the bundles, sizes of the folds, and waste of solutions are elements in his unit's efficiency. The second lieutenant in a Maintenance Company knows that his mask repair platoon should process a given number of masks in a given period of time; but he also knows that breakage of eyepieces, estimate of wear on straps, and judgment of deterioration of face pieces are factors in his platoon's efficiency. He knows that it is not enough to get the smoke generator running again; that hunches operate to identify malfunctions; that during maintenance good men anticipate

and prevent future malfunctions; and that waste must be held to a minimum. He knows that these are all factors influencing efficiency of his unit. The CTSID sergeant, too, knows that factors of dexterity, speed, accuracy, sequence of actions, and the like affect the quality of performance of his unit.

Many of these factors are already considered in judgments of proficiency that are exercised. The staff believes that uniform attainment of proficiency in unit training cannot result until such factors are evaluated in measurable units.

Recommendations

1. More detailed statements of objectives of training need to be developed, including clear statements of proficiencies needed, so that responsible officers will have better descriptions of behavior which characterize the effective unit and definite criteria on which to base their evaluations.

2. ATP's 3-203 (Maintenance Company), 3-205 (Processing Company), and 3-201 (Smoke Generating Company) should include work on identification, because CBR attack in rear areas is certainly possible. Smoke Generating Companies especially will operate in areas subject to CBR attack, and such units should develop particularly effective teams for identifying CBR agents.

3. Field training, in part at least, should encompass experiences which will provide refresher training in masking and in maintaining the items of protection normally furnished the soldier and his unit.

4. AIP 3-201 (Smoke Generating Company) should include emphasis upon self- and first-aid methods and techniques.

5. Considerable attention should be given in unit training to exploitation phases of CBR warfare including: avoiding contaminated areas, crossing and/or operating in contaminated areas, proper individual and unit action on alarm in accordance with unit SOP, reporting attacks to adjacent units and higher authority, and adjusting operations as necessary to accomplish the mission under CBR conditions.

6. Units should focus considerable energy and effort on keeping personnel aware of changes in doctrine and equipment.

7. Field training should, as quickly as possible, be removed from the simple but necessary practice variety (operating the laundry, disassembly and reassembly of the smoke generator, etc.) to actual operation in the field sometimes under adverse conditions. Such exercises should not comprise only an occasional sporadic part of the training but should be made a scheduled major portion of it. Critiques regarding performance in such exercises should provide most of the instruction in all aspects of CBR training--recognition, protection, self aid and first aid, decontamination, and exploitation, including considerations of new developments in doctrine.

8. Unit training officers and noncoms should be given guidance in the preparation of job analyses, job sheets, check-off lists, and performance standards for each skill a man is taught. Progress charts for each man should be maintained.

9. The assistance of the Medical Corps should be earnestly solicited in identifying anatomical models, charts, pictures, and films that can be adapted to teaching the effects of those agents which troop units will not be allowed to experience. There should be little justification for the

difficulty uneducated men are having in understanding only those CW, BW, and RW effects they need to know.

10. An exercise should be developed for unit training to integrate map reading and CBR training involving a simple problem in familiar territory.

11. At least in their earlier stages of training, men in CmlC units should be as carefully protected from interruptions in their training schedules as are students in CmlC School. Large, uninterrupted blocks of time should be scheduled during which no interference with training or schedule will be permitted.

12. An organized, scheduled, and mandatory program for upgrading the training skill of cadre personnel should be undertaken.

Section V

COURSES IN THE CHEMICAL CORPS SCHOOL

This section consists of an analysis of courses offered in the Chemical Corps School at Ft. McClellan. It begins with a general analysis of courses for enlisted men. A detailed analysis is made of one of these courses for purposes of illustration. Next, a general analysis is made of courses for officers, and this is followed by a more detailed report on one course. The section ends with recommendations for the improvement of CmlC courses.

Sources of Information

The sources of information included the following POI's:

<u>Enlisted</u>		<u>Officer</u>		
3-E-1	3-E-5	3-0-1	3-0-5	3-0-10
3-E-2	3-E-6	3-0-2	3-0-6	3-0-13
3-E-3	3-E-7	3-0-3	3-0-7	3-0-14
3-E-4	3-E-8	3-0-4	3-0-8	

These materials were supplemented by a comprehensive sampling of lesson plans, a large accumulation of handouts, and a selection of field manuals and technical manuals. Officers' courses and enlisted men's courses were visited and observed. In addition, the staff interviewed officers, instructors, trainees, and members of the Research and Analysis Division and Publications Department.

I. Chemical Corps School Courses for Enlisted Men

Courses established at CmlC School to train enlisted men in their MOS's have for each a broadly-stated general objective such as: "To train enlisted personnel of the Chemical Corps to assist in the establishment, maintenance, and application of all phases of defensive and offensive CBR warfare." Such broad statements of objectives are of little assistance in setting up a training program, in delimiting scope and content, or in evaluating effectiveness.

Analysis of Course 3-E-1

Chemical Staff Specialist, Enlisted

The course for the Chemical Staff Specialist, Enlisted (3-E-1) is the School training for MOS 1870. It is presented here as an illustration of CmlC School courses for enlisted personnel.

Objectives of Course 3-E-1

With no clear-cut statement of specific objectives it is difficult to determine exactly how functional a course is. There should be a more direct relationship between the duties and qualifications in the MOS and the POI. The duties and qualifications should become the objectives. As far as possible, they should be restated in the language of duties and qualifications. This procedure would give greater assurance that all that is taught is functional; that is, useful in doing what needs to be done on the job. For example, the Methods of Instruction section may cover the ground, but the MOS items and the lesson topics do not show close relationship.

The comparison of MOS and POI shows that instruction generally covers the scope of the job analysis, but the same is not true of the details of the course. A specialist at the Chemical Corps School should compare in detail the duties and instructional topics; he should check the duties covered, duties omitted, and content not needed. This should be followed by a more careful check of the content and activities of each lesson against the specific duties enumerated in the MOS. Ultimately the same check of the lesson plans should be made against the analysis of the job of the Chemical staff specialist. Finally, the POI and plans should be revised, omitting the nonessentials and adding the essentials.

Content of the Course

Course 3-E-4 is the first phase of 3-E-1. The two courses were examined for discovery of any duplication or overlapping. The topics common to the two phases are as follows:

CBR Technical

Matériel

Protection

The lessons which are common to the two phases are:

Introduction to Radiological Defense

Theory of Radiac Instruments

Medical Aspects of Atomic Warfare

Introduction to Biological Warfare

Protective Masks

Personnel Decontamination

Decontamination Procedure and Materials

Impregnation of Clothing

Decontaminating Field Exercise

An examination of the outlines of the two courses shows a very definite overlapping and some duplication of topics. In those cases in which the second phase stresses newer or advanced theory or developments, the recurrence of the topics is justifiable. On the surface, however, it appears that much of the theoretical treatment in the second phase is not necessary for the satisfactory performance of the job. A more careful analysis of the lesson plans by competent CmlC personnel would be necessary to determine the exact amount of duplication.

Phase II of 3-E-1 consists of 179 hours of practical exercises; 145 hours of conferences; 7 hours of lectures; and 9 hours of reviews and examinations. In addition, 20 training films and 16 demonstrations are specified. Exclusive of military training, nearly 40 per cent of the time is devoted to practical exercises, although many of these are oral or written problems involving secondary rather than primary experiences.

Beyond the above classification of lessons there are no other specific teaching suggestions. No reference is made to teaching aids other than the training films and items of ammunition. The standards of proficiency are not specified. Although nine examinations and review are designated, no hint is given as to their nature.

Lesson Plans

Following the introductory specifications on the LESSON SUMMARY SHEET, the content of some lesson plans consists of solid subject matter followed

by a few questions and a brief summary paragraph. Some lesson plans do not cover the topics specified in the scope of the lesson. For example, the lesson plan on Harassing Agents confines itself to flame throwers, while the POI lists several types of incendiaries.

The training aids consist of visual casts, charts, filmstrips, training films, and mimeographed handouts. The references include field manuals, student summary sheets, and technical manuals. In addition, references for the instructor are listed.

The typographical form varies from lesson plan to lesson plan. Some are simple, contain a few headings, and are easy to follow. In some, the continuity is broken by an excessive number of headings.

The objectives, while not clearly stated as such, are implied in the DESCRIPTION OF PERIOD on the LESSON SUMMARY SHEET. In some instances the DESCRIPTION OF THE PERIOD is a repetition, verbatim, of the scope of the lesson in the POI. Only two out of six lesson plans begin with a specific objective. Every lesson plan should open with a definite statement of the goal of the lesson.

As indicated earlier, the lesson plans go more deeply into the technical explanations than is necessary for the performance of the duties of the Chemical staff specialist, the morphology and physiology of micro-organisms being a case in point. On the whole, few suggestions for class participation are mentioned and few references to familiar field situations are made.

Conduct of Training

From an analysis of the content of enlisted POI's, these conclusions are reached:

1. POI's which are prepared at approximately the same period of time are likely to have considerable overlapping of content—especially in early phases of training. (Example: POI's for Courses 3-E-5, 3-E-6, and 3-E-8 were prepared in July and August of 1953. Each has similar format, including three specific "phases" of training. POI's approved earlier do not divide training into these phases. This development may have resulted from recognizing the desirability of providing the same basic instruction for all persons working toward a Chemical Corps MCS, or may be simply rigid application of a pattern which was deemed desirable at that time.)

2. A great deal of duplication exists between the course of instruction outlined for MOS 1870 (3-E-1) and the Associate Chemical Corps Officer Course (3-0-2). Page after page of the program is identical, including file numbers, content descriptions, references, and examinations. It is doubtful that this duplication can be justified, even though MOS 1870 is an advanced course for noncoms with Grade E-4 and above.

3. There seems to be little significant difference between the CBR training provided for MOS's 1328, 1786, and 1140, even though the ultimate duties of the men are dissimilar. Differences which do exist consist mainly of "more or less of something" rather than fundamental changes in training program based on analysis of duties to be performed.

4. CBR training as outlined in the POI's is frequently described in such general terms that no clear or universal understanding of what is to be

accomplished can be gained. The following examples, drawn from page 8 of 3-E-5 (MOS 1328), are typical:

Introduction to radiological defense; characteristics of air, surface, and sub-surface bursts. (TF)

Introduction to mechanics of ion chambers; laboratory; iso-intensity survey using ion chamber. (PE)

Physiological effects of the atomic weapons on the body. (C)

Individual and collective action before, during, and after atomic attack. (C)

Nature of Biological Warfare and its possible uses in the field. (C)

Possible BW agents injurious to man, causative agents, stability, methods of distribution, incubation period, pathology and symptoms, period of disability, mortality rate, diagnosis and treatment as well as preventive measures. (C)

5. CBR training as outlined in the POI's for the most part is verbal training interspersed with an occasional film, demonstration, and practical exercise. The letters placed after the examples drawn from page 8 of the 3-E-5 POI indicate that four out of six of the periods (representing at least half of the total number of hours) are essentially talking-listening experiences. While it can be argued that anything else is wasteful procedure because of the time it takes to experience everything firsthand, it can also be argued that men enrolled in the course have previously had lectures in basic and advanced individual training covering much of the same material, and need another type of learning experience to enable them to develop additional proficiencies or to increase the level of those already possessed.

6. Every course outline starts all over with "introductions to," "definitions of," and "classifications used." Such repetition at every level of training must be boring to the learner.

7. Much of the work in radiological warfare is, in the judgment of the project staff, more theoretical than is necessary to develop the proficiencies needed in the field. Annex No. 5 of the POI for 3-E-1 (page 25), which includes subjects such as structure of matter, electromagnetic radiation, and photodosimetry, is a good example of overemphasis on theoretical aspects. The project staff assumes that the goal of instruction in this instance is not to make theoretical physicists out of the men, but rather to develop the proficiencies needed in order to perform the duties outlined for MOS 1870.

8. In general, the major areas of concern are included in the outlined scope, but exploitation is slighted. Since almost no emphasis is given in the ATP's to exploitation, it seems apparent that the courses for specialists in the School should focus considerable attention upon this aspect of CBR warfare. An amount of time which seems to the project staff to be realistic is included only in 3-E-1 (MOS 1870).

2. Chemical Corps School Courses for Officers

Basically, POI's which outline training programs in CBR warfare for officer personnel are similar to those which outline programs for enlisted men. Most of the generalizations which were made concerning CBR training programs for enlisted men at the Chemical Corps School are, therefore, directly applicable to programs for officers.

Objectives of Courses for Officers

General objectives are stated for each of the separate courses provided for officers at the Chemical Corps School. These objectives are more clearly defined and seem to have resulted from a more careful definition of the purpose of the courses than is evident in courses for enlisted men. The nine-months' advanced course for Chemical officers, for instance, has as its stated objective: "To provide advanced branch training to officers so that they are thoroughly grounded in the duties and responsibilities appropriate to field grade Chemical Corps Officers." The POI for the Senior Chemical Officer Course (3-0-14) states that the purpose of the course is "to provide field grade Chemical officers with the latest information in the field of CBR warfare and refresher training in operational, administrative and logistical aspects involving Chemical troop units and Chemical staff officers." These statements clearly differentiate objectives of the two courses, and an analysis of implied objectives as determined by content outlines supports the general thesis that there is less duplication of training in courses for officers than in those provided for enlisted men. Undoubtedly, such practices can be justified, for officers are more highly motivated to learn than many enlisted men.

Analysis of Course 3-0-8, CBR Indoctrination Course

The CBR Indoctrination Course is presented to illustrate officers' courses conducted at CmlC School. Two facts should be kept in mind while considering the appraisal of this course:

First, Course 3-0-8 is selected for description because the project staff attended every class session and has intimate knowledge of its operation from the trainee's position. Second, the staff is well aware that this course is the least typical of the School courses. An extremely difficult situation is faced in designing a course for the Reserve component, including Army, Navy, Marine Corps, and civilians. Also, the insurmountable task of giving in two weeks the MUST items in CBR at the level of knowledge and understanding needed by this officer group is obvious. Nevertheless, when further study revealed a similarity of problems in Course 3-0-14, Senior Chemical Officer Course, it was decided to describe 3-0-8 in detail since many instructors, lesson plans, references, training aids, and exercises were identical.

Objective of Course 3-0-8

The objective of Course 3-0-8 is "to train reserve officers of all branches in the application of CBR defensive measures, procedures, and techniques." The course is designed for a reserve component officer whose actual or anticipated assignment is to duty as a CBR officer, CBR instructor, or officer in the Chemical section of USAR.

In the absence of an MOS, the general objective is not an adequate guide to the specific content and activities which should make up the course. The POI jumps from the general objective, to the subject outline, to the course without any breakdown of the general objective into its specific goals. Before a course is taught, the planner should know what the learner needs to be able to do and to know. In other words, the job analysis should precede the planning of the course.

The only clue to the specific objectives is the scope of instruction, which consists of an outline of the topics, theoretically treated, under each of the five subjects. There is need for a more definite statement of objectives of each course. When they are not available in the MOS manual, it is impossible to know for what purpose one is building a course and what it should include.

According to the Army Instruction Manual, a lesson is "a feasible teaching segment of job assignments." Although the term "feasible" may be narrowly construed, the lessons are more fragmentary and more minute than the professional interpretation of the term. The same manual prescribes that the objectives and job analysis should precede the planning of a course, which appears not to have been done.

Content of Course

The course as taught does not follow the sequence in the FOI. Chemical and biological warfare are taught simultaneously. Radiological warfare and plans and training are also taught simultaneously.

Conduct of Training

The CBR Indoctrination Course, consisting of eight-eight hours of instruction, is organized as follows:

1. Organization, Plans, Operations, Training	39 hours
2. Atomic Warfare	9 hours
3. Biological Warfare	9 hours
4. Chemical Warfare	10 hours
5. Protection and Materiel	17 hours
Reserved for Commandant	4 hours
TOTAL	88 hours

The sequence of the course topics in CW when matched against the sequence called for in the POI is as follows:

POI	1	2	3	4	5	6	7	8	9
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Actual Course	1	3	6	4	7	2	5	8	9
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The sequence in Protection and Materiel, when matched against the POI, is as follows:

POI	1	2	3	4	5	6	7	8	9	10	11	12	13	14
-----	---	---	---	---	---	---	---	---	---	----	----	----	----	----

Actual Course	1	3	4	2	10	11	5	12	13	6	7	8	14	9
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here again the sequence differs. The series of lectures and topics does not always have unity and continuity. It is hard to determine the basis for the particular sequence. The staff had only a portion of the subject entitled Organization, Plans, Operations, Training. It was properly reduced in size, although it may have been condensed to make room for the section on passive defense operations and training for the Naval group in the class. This subject was taught last, although it is listed first in the POI.

The scheaule, apparently, was adjusted to suit the convenience of instructional personnel rather than the needs of the trainees. The program of instruction is the product of a conference of School personnel followed by two revisions of the first draft. The final draft is submitted to the Chief of Army Field Forces and the Chief Chemical Officer whose suggestions are incorporated in the POI. The sequence in the carefully planned POI should be followed more closely in planning the teaching schedules.

The POI under consideration represents a beginning stage. Eventually it should contain informational content and teaching procedures which will be more helpful in the preparation of lesson plans.

In many instances the information is too specialized, too technical, and too theoretical for the particular purpose of the course. In some instances the material could be reduced to one-fifth of the time given to it. For example, some of the theory underlying the impregnation of clothing is not essential. A demonstration of the actual use of the field decontaminating kit should be sufficient. In fact, this could be most effectively learned in the field.

Instructors

The rejection rate for instructors is low because the supply of qualified personnel is inadequate. The strength chart shows that there is an enormous discrepancy between the rank of the officers authorized and the actual officers assigned. For example, although 26 lieutenant-colonels are authorized, there are actually only 8 in the School. On the other hand, while only 7 lieutenants are authorized, the School is obliged to use 72 lieutenants.

The selection of personnel seems to be a major problem. At the present time the turnover is high, the quality is mediocre, and the field experience is limited. How to secure a qualified and permanent staff is a major problem. There is a need for a stronger policy of assigned personnel. The instructors should remain long enough at the School to profit from continuous training.

The experience of one School staff member is a good illustration of the selection and training of the instructor. He had been in the Army thirty-four months and was to be discharged in two weeks. He had been teaching one year. He had some training in his basic course and some in his

officer's training course. After he was selected to teach, he prepared a lesson plan, observed classes, and then used the field manuals as a source of supplementary information. He had taught the particular lesson twenty times and said he had practically memorized it.

Many of the lectures given by the inexperienced instructors were based upon lesson plans prepared by others. Their information was limited and they were unable to answer questions at times.

From the point of view of one of the young lieutenants, the role of the instructor in the development of a course includes the following steps: (1) the director of training, in conference with branch representatives, prepares the scope of the course; (2) the instructor follows the training memorandum closely, although he may supplement it from experience; (3) the instructor prepares a written plan; (4) the lesson plan is reviewed by a board of officers, largely for doctrine; (5) it then goes to the Research and Analysis Division for a factual and editorial check.

This course, lasting two weeks (88 hours), was taught by 35 instructors. Twenty-two instructors met the class only once; 13 instructors met the class more than once; no instructor met the class more than five times. The reason for this is not known. It may be due to the time available for each of the instructors or it may be due to overspecialization. It is reasonable to assume, however, that the number of teachers should be reduced. A smaller number of instructors would give the course greater coherence and continuity.

Since the course consists of five subjects, a first step toward unity would be to reduce the number of specialists within each subject. If the

course depends upon the possession of a dozen or more fields of specialized competence, then how can the student be expected to master all of them?

Source materials. The principal sources of information and skills used by instructors consist of programs of instruction, lesson plans, handouts, films, field and technical manuals, and the experience of the instructor on the post or in the field.

On the basis of experience in the indoctrination course, the student is given fifteen or twenty manuals and other publications which he uses spasmodically. Instead of scattered material for each course, it might be desirable to assemble all the basic materials in one bound or loose-leaf volume. The research specialist in the publications department gave an illustration of what can be done along that line. He said that in the area of Chemical Corps Materiel eleven pamphlets and other publications were originally used as sources of information. A special text is now in preparation which will replace the original eleven different publications.

Instructional procedure. In general, the lectures are fair. Considering the mode of selection, the qualifications, and the experience of the teachers, the performance is commendable. Most of the instructors talk without notes, however, the majority are dependent upon information (usually in outline) contained in the transparencies and other teaching aids.

It is difficult to keep up with the theoretical part of the lectures. These presentations should be accompanied by more practical illustrations as well as teaching aids. For example, in discussing the markings on the

munitions, a canister with markings would be helpful. The lectures which are easiest to follow are accompanied by the extensive use of equipment. The lectures which are most difficult to follow are those that involve the use of technical terms, particularly those consisting of initials. A glossary of technical terms would be helpful if it were continuously available on a sheet of paper or perhaps on a chart.

The definitions usually given at the beginning of a lecture are involved, ponderous, and difficult to follow. They could be greatly simplified, as demonstrated by some of the instructors. There is much classification for its own sake. The practice of dividing everything into parts and giving it a letter or group of letters appears to be followed slavishly whether it is necessary to do so or not.

Teaching aids. In general, the variety of teaching aids, such as transparencies, films, charts, mock-ups, handouts (short mimeographed items), models, and other equipment is one of the assets of the Chemical Corps School. The transparency is most effectively used by those who employ the topics as jumping off places for further explanation or elaboration, or at the end of lectures for purposes of review. In many instances the items on the transparency are merely read by the instructor.

Films are used extensively, but they are shown without introduction, points to look for, or any follow-up. Training in the proper use of film for instructional purposes is a basic need. The School should explore the possibilities of the filmstrip.

Some of the demonstrations could be improved. For example, in explaining the parts as well as the use of the gas mask it would be more effective if each listener had a gas mask in his hand. In some instances the viewers are too far from the demonstration to catch every detail. It might be wise to invite the group to form a compact circle around the demonstrator.

Several of the handouts consist of outlines with plenty of blank space for notes. The use of this type of sheet has advantages. It gives the learner the outline he needs in order to take notes without spending too much time keeping track of the thread that ties the whole lecture together.

Recommendations

1. Objectives for each aspect of training should be clearly stated. The current brief outlines of content to be covered are not satisfactory. The objectives should be stated in terms of the responsibilities and duties in CBR warfare which personnel must assume, the behavior which is expected, and the level of proficiency to be developed.
2. When objectives of training are clearly delineated, a careful study should be made of the content of each course with a view toward elimination of unnecessary content, and inclusion of that which is basic for the development of field proficiencies needed by Chemical officers and specialists.
3. Pre-testing to identify what students already know as they enter the various courses should be standard procedure. Course content should be modified and instructional procedures should vary according to the backgrounds of the individuals comprising the groups.

4. Much more careful development of courses is needed. The recommended curriculum department, staffed with qualified specialists who have also had practical field experience, should be primarily responsible for developing courses which would have unity and sequence and which would make sense to the learners.

5. Courses which are training men for different duties should reflect such differences by the experiences provided and the content outline. Procedures, scope, and content do not suggest how different proficiencies can be developed by identical or similar training.

6. Many more opportunities for men to demonstrate proficiencies in the field are needed. Memorizing a lecture or a technical manual is no guarantee of field effectiveness. Much more of the training program for enlisted men who are in training to become Chemical Corps specialists should be based upon doing rather than listening.

7. Each enlisted man should have practical experience periodically in performing his duties under extremely adverse conditions—conditions imposed by weather, terrain, supply inadequacies, loss of leadership and equipment through enemy action, loss of sleep, necessity for retrograde movement, and the like. Whenever such practical exercises are provided, the men should be briefed in such a manner that they fully understand the need for practice of this type. These adverse conditions, however, should be introduced only into practice duty exercises and not into the basic, initial learning exercises before the necessary skills are acquired.

8. The training programs of the officers' courses should include all the essential CBR content. Major differences exist in the training program

outlined—differences which are clearly determined by the purpose of the courses. As an example, the course for radiological defense officers (3-0-7) contains no information about recognition of chemical and biological agents. All time devoted to "Recognition" is directed to radiological warfare; whereas, some consideration should also be given to the possible involvement of CW and BW under RW conditions.

9. More emphasis should be given to hygiene and sanitation, maintenance and care of protective equipment, decontamination (especially equipment), and operating in contaminated areas.

10. Except for the employment of atomic weapons and calculation of chemical munitions requirements which are already covered, greater consideration should be given to CBR tactics in the nine-months advanced course for Chemical officers. The Senior Chemical Officer Course (3-0-14) and the two-weeks Indoctrination Course (3-0-8) are the only courses which now give any fundamental consideration to the tactical use of CBR agents.

11. Some refresher training in decontamination should be provided in the Senior Chemical Officer Course.

12. Much more opportunity should be given for officers in training to participate directly in command and staff responsibilities in field exercises involving CBR warfare. Facilities are available through coordinated planning with troop units and utilization of enlisted men in School courses for many good field exercises.

13. Considerable time allotted to CBR training in the nine-months advanced course for Chemical officers, especially in biological and radiological phases, is of a basic science variety which is likely to be

unnecessarily repetitious for many of the officers and too skimpy for others. If the groups grow no larger than the number which are now admitted into such courses, a differentiated program based upon the varied backgrounds of experience which the officers bring to the School should be developed.

14. Continuous efforts must be maintained in improving the instructional skills and teaching techniques of the School faculty. The present wide variations in abilities and teaching competence do not display the uniformly high quality of instruction that should be expected.

15. Study should be directed toward the excessive compartmentalization of courses, the number of different instructors, and the degree of specialization of each. Experimentation should be conducted in using large blocks of time with one instructor, who in turn should have extensive field experience upon which to draw. Fewer instructors in a given course should provide greatly improved continuity, coherence, and assimilation in learning.

16. A ruthless purging of courses of technical content having no utility in the field should be made, and the resulting available time should be devoted to more practical training of students in how they should conduct training when they return to their posts. If considered desirable, a single course could be designated to provide the nonessential but broadening knowledge now included in every course examined. This course probably should be limited to CmlC career personnel.

17. A permanent Curriculum Department should be established to absorb the Research and Analysis Division and the Publications Department.

Qualifications for the directing staff should be rigidly drawn to require a high level of professional training and experience combined with a comparable level of military training and field experience. This Department should be charged with three principle functions:

- a. To conduct a continuous program of evaluation in CmlC School courses and instruction.
- b. To engage in experimental studies designed to improve training and instruction in terms of field requirements.
- c. To serve as a resource center, available to every CBR instructor in the Army, for the dissemination of new CBR training information and help in solving local CBR training problems.

Section VI

PREPARATION FOR OVERSEAS REPLACEMENT TRAINING

Since POR training was not observed, this section reports conclusions reached from an analysis of directives and from interviews in the field. Most of the generalizations which have been made concerning objectives of CBR training as stated in Training Memorandum No. 7 are directly applicable to the training specified in Training Circular No. 16. The stated objective of POR training is "To insure that each individual can pursue his assigned mission aggressively and with maximum effectiveness in the presence of CBR hazards."¹

Objectives in POR Qualifications

While the project staff can find little to question about the desirability of the broad objective of POR training, need exists for clearly stated, practical, specific objectives which point up the training tasks. Such statements are not found in Training Circular No. 16. Objectives can be implied, however, from the statements included under "Scope" and from the content which is outlined in paragraphs ten, eleven, and twelve (Chemical warfare, Biological warfare, and Radiological warfare). The statements given in Paragraph 9—Scope—are most revealing:

- a. Review of established doctrine and techniques for protection against the effects of CBR agents, with primary emphasis on—

1. TC 16/2, Par. 2, Sec. 2.

- (1) Protective measures within the capabilities of the individual and the equipment which he carries on his person.
 - (2) Expedient measures improvised readily in the field.
- b. Changes and development in doctrine, procedure, and equipment for individual CBR protection.²

Content which is to be taught in the two hours of instruction is then outlined. Generally speaking, content has been carefully selected in terms of the outlined scope and broad general objective. As a matter of fact, TC No. 16 is perhaps the most effective of all the publications analyzed. Behavior is stressed. Nonessential but NICE TO KNOW information has been eliminated for the most part.

Generalizations Concerning Training Circular No. 16

The following generalizations can be made about Training Circular No. 16:

1. Objectives are not clearly stated in terms of specific behavior. Although general statements are clear and specific content has been carefully screened to eliminate fluff, objectives have to be implied from scope, with no assurance that they will be uniformly inferred Army-wide.
2. All of the important areas of CBR training from the individual's point-of-view are covered in the stated scope and in the content outlined. As far as breadth of coverage is concerned, Training Circular No. 16 perhaps specifies more essentials than any other single document.
3. The implied objectives cannot possibly be achieved within the specified period of time. The circular seems to imply that, except for one masking drill during a CN or CN-DM attack, the content will be quickly covered verbally. Since, as indicated in TM 21-250 and FM 21-5, persons

2. Ibid.

learn to do by doing and to reinforce a skill by practice, enough time should be allotted so that students would perform protective actions they would take in a simulated chemical, biological, or radiological attack. Verbal learning is not enough for prompt and accurate action skills, nor is verbal review. If more time cannot be given, the content should be drastically simplified.

4. The emphasis on changes and developments in doctrine is sound. For many men (at present) this will mean learning to put on, properly adjust, and clear a mask which differs slightly from the type which was utilized in basic training. Soldiers destined for overseas service certainly should be brought up to date concerning developments in CBR warfare, and the equipment which they are issued should be the current standard items. Moreover, they should learn how to use it by using it in POR training—if not earlier.

5. The content which is outlined does not to any significant extent focus attention upon the implied objective "expedient measures improvised readily in the field." There is little doubt that attention should be directed to proper action under attack when a mask or water or BAL or detector kit or portable decontamination equipment are not provided; yet the assumption seems to be made that such situations will not occur in warfare.

Training Management in POR Qualification

The project staff did not have an opportunity to observe a POR exercise in operation. No POR training was being conducted during any field visits. At one basic training center, however, the staff was advised by the Chemical

Officer that two individuals were being sent to this center for their POR instruction. He detailed an instructor to spend two hours with them, including the time spent in the gas chamber exercise.

It is evident that their commanding officer was trying to see that these two persons received the best POR training available, for they were being sent to this center from an Army establishment in another state. On the basis of general observations, however, a genuine concern is felt for these for whom POR training will mean little more than a 2-hour gas chamber exercise or, still less, a 2-hour lecture on CBR warfare on the basic training level.

It is doubtful whether two hours is enough time to bring one up to date on changes in CBR warfare doctrine, procedures, and developments, except for selected individuals who have had access to the files of regulations, memoranda, circulars, and the like. Without any objective justification whatsoever, but in all seriousness, the staff is skeptical about any increase in proficiency required in the field that is presumed to result from POR training, and it doubts that any increase in knowledge and understanding is effected. This speculation should be explored further.

Recommendations

1. "Changes and development in doctrine, procedure, and equipment for individual CBR protection" should be gathered and forwarded to all CBR training activities more promptly and efficiently than at present if this POR objective is to be attained.
2. A sequence of practical drill exercises requiring the same degree of trainee activity as the gas chamber exercise should be devised for POR

training in identification, protection, self aid and first aid, decontamination, and exploitation. A CBR obstacle course should provide the necessary facilities.

3. Research should be conducted to determine: (a) any increase in CBR proficiency resulting from POR training being given under present practices, and (b) time required in POR training to accomplish objectives.

Section VII

CBR TRAINING AID PROBLEMS

During World War II the Armed Forces developed the most extensive and elaborate program of training aids ever seen. Army awareness of the values and limitations of aids in training is clearly shown in FM 21-5, FM 21-6, FM 21-8, FM 21-250, and numerous similar publications. Indeed Army literature would appear to be paraphrased if the Do's and Don't's for a training aids program were reported. Thus far, this report has identified problems in CBR training that relate to objectives, proficiencies required in the field, training procedures, and estimates of success. The primary concern for training aids must be based upon these training problems rather than upon the ideals--sound principles and theory of instructional aids so clearly formulated in the literature.

Each principle guiding the use of aids in training could be applied to each level of training in CBR warfare. This report has many examples of difficult-to-learn aspects of CBR warfare--indicating the possibility that a good training aid might make the skill or knowledge easier to learn. Numerous instances have been cited to show the lack of "realism," the need for better simulation, and for less simulation and more direct personal experience, suggesting possible clues to training aids. The excessive verbalization in training, the unnecessarily difficult vocabulary used by

instructors, and the abstract nature of some MUST knowledge--all suggest that training aids might increase learning efficiency.

One of the basic issues confronting the staff has been the question of whether to study the training-aid program with an aim toward using new aids as crutches to support the weaknesses identified in CBR training operations, or whether to assume that steps would be taken to remedy the observed lag between principles and practices and to study the training aid problem on the basis of CBR instruction as it might be conducted. The staff has tried to consider both alternatives as it approached the terminal phase of the project.

Training Aids in Individual CBR Instruction

The following aids and equipment items were observed in actual use at Basic Training Center A: four pictorial charts in GTA 3-1, protective mask, M9A2 detection kit, M5A1 protective ointment kit, four types of gases detonated, smoke grenades, tear gas grenade, and gas chamber. There was to have been one film on Atomic Bursts (Misc. 7815) but the projector was broken and the film was not used. Each of these aids is on the list in Training Memorandum No. 7, but many of the aids suggested in the memorandum are not being used in this 10-hour course.

Comment was made in Section II on the locally-prepared visual casts (in color) being used at Center B, and of decontamination markers. Significantly, no provisions were seen at any basic training center for visual projection of material at the scene of outdoor instruction.

Field identification of chemical agents is one of the two most difficult MUST proficiencies established by OCAFF for basic trainees to learn.

The other is the application of Self Aid, in proper sequence in accordance with observable symptoms. At every center visited these two "minimum standards of proficiency" or MUST skills appear to be the least known, the least understood, and the least mastered of the CBR training objectives. The blackboard and the M5A1 protective kit (in actual size for use with a group of 200 trainees) are the aids being used in these two areas of training. The staff observed that trainees appear to consider elements of BW among the most difficult to learn; but it concludes that instruction includes so much NICE TO KNOW and so little MUST KNOW information about BW that trainees are confused into thinking that there should be more to their basic proficiency in BW than good personal hygiene and field sanitation.

In considering the protective mask as a training device, the staff does so on the grounds that the mask is issued during the appropriate training period at Center C and is recalled at the end of the two-hour period. One phase of gas mask drill was observed to be inadequate—or the development of skill was not complete. Trainees seemed to learn to inspect the visible components of the mask; they learned readily enough to adjust the harness; and they learned to check the fit for leakage. However, after giving instructions on how to clear the mask, instructors and their assistants paid no further attention to this step in masking procedure. As a result, numerous recruits were observed in the mask drill period and in the gas chamber exercise to put on the mask, to check for leaks, and to fail to clear the mask. No aid or device is needed for this learning problem. A- explanation of the "why" for clearing and supervision of this step during drill should solve it.

Memorandum No. 7 describes a cross-section model of a foxhole to be prepared locally. This device was not observed in use in CBR basic training. Nor was an actual, properly-constructed foxhole ever observed in the period on protection against RW. It would appear that the effort to inject "the real thing" into training would call for the demonstration of foxholes, with overhangs, adjacent to the site of the outdoor lecture on RW protection.

The problem of the outdoor use of films in the 10-hour course has been noted. The staff has been advised informally that the Army has solved the problem of visibility of the image in daylight. Nevertheless, visual projection was not observed in outdoor instruction at any stage of CBR warfare training at any Army establishment visited.

Another problem involving visibility is noted elsewhere in the report. GTA's listed in Memorandum No. 7 are not prepared for outdoor use in groups of 200 men. The GTA's examined probably are not durable enough to withstand extensive use under outdoor weather conditions. Nor would they be readable at the rear of the group if they were durably mounted on plywood and waterproofed.

As a training aid, posters have a direct impact on the learner in passive, informal situations. They are used effectively at times when the attention of the trainee is not focused upon learning. Frequently they are designed to place a forceful emphasis upon behavior, action, and things to do. The directions for action, the consequences of ignorance, and the personal messages posters carry are recognized by millions of friends of the Sad Sacks, Trigger Joes, and Dilberts in the Armed Forces. The staff members have seen CBR warfare posters at only one Army establishment.

A very complete system of GTA charts is published, obviously designed to help the instructor present organized subject matter in a classroom. This purpose is quite in contrast to the role of posters in helping the trainee to learn. A series of posters should emphasize the importance of CBR skill to the trainee in the mess hall, day room, recreation center, barracks, and elsewhere.

The gas mask and gas chamber are the two most successful training aids in use in the 10-hour course. Here the gap is closed between training theory and training practice. The mask in temporary possession of the trainee is, during learning, genuine equipment. The chamber, during learning, is the genuine chemical warfare atmosphere. It is true that combat conditions are not simulated, but learning is still in progress and learning conditions should still be controlled. Somehow it is pathetic to see new recruits, harrassed by their daily routine, and bewildered by the maze of things to be learned, go through the chlorine chamber exercise. They wait their turn to enter the chamber, fearful that here is another episode in which they will show their ineptitude and lack of skill. They dread the consequences if they have not learned properly. However, as they come through the chamber without mishap, they show on their faces or in their eyes the pride in a correct response, in successful learning, in their ability to do an Army job well. Here the Army puts into successful practice the sound principles upon which CBR training is supposed to be based.

Training aids listed for POR training support the earlier interpretation that individual CBR training Army-wide is not aimed above the level of skill developed in basic training. The nine aids listed are all on the list

for the 10-hour course. Four of the nine are detection devices: M-6 paper, M-5 paint, M7A1 crayon, and M9A2 detector kit. The six references suggested are apparently for the use of the instructor. If POR training is a review of the 10-hour course, the most useful CBR training aids have been specified, since the gas chamber exercise is stipulated as a part of the two hours in the POR outline.

The Naval Air Training Command and the Air Force Training Command are two of the military agencies constantly striving to "service and upgrade" instructors with regular training periodicals, newsletters, instructors' manuals, training research reports, and similar resource materials. These agencies are searching for clever solutions to training problems, ingenious locally-prepared training aids, and promising suggestions for the improvement of training. Pictures, drawings, and specifications are distributed to all training centers.

It is realized that training responsibility is organized differently in the Army, but there can be no valid excuse for allowing a successful innovation or solution in CBR training at Center X to escape notice, nor for lack of a positive exchange of ideas among CBR instructors throughout the Army. Surely CBR instructors at Ft. Dix, Camp Gordon, and Ft. Jackson would benefit from an exchange of training know-how. Field Manuals, Technical Manuals, and limited Training Aids Catalogs do not meet this need. If OCAFF promulgates "minimum standards of proficiency" and hopes for their uniform attainment Army-wide, the required level of training efficiency must be reached Army-wide. As is so well illustrated in Fig. 1, FM 21-6, in Army training the training aids are an important element but not the keystone.

A training aid "clearinghouse" undoubtedly would help the instructor, who is the key to successful training.

Training Aids in Troop Unit Training

Training problems in CBR warfare change abruptly when the trainee moves into Advanced Individual or Unit Training. He no longer is under the time pressure that made the assimilation of CBR instruction difficult. The formal CBR instruction observed in unit training appears to repeat the instruction given in basic training, only with less training skill on the part of those doing the instructing.

The primary activities of trainees are concerned with the job specialty they are learning, and they are taught through direct participation with genuine equipment. The training situation, however, is not genuine for CBR conditions; and when the trainees experience a real or simulated situation on the range, the job program generally is not real.

CBR training aids are in use during lectures to men seated outdoors on bleachers. The blackboard with white chalk is the most commonly-used device. CBR films are used indoors. Most of the MOS training shops display "breadboards" of the component parts of the equipment being used, but they are not for CBR instruction. With no new CBR skills or duties to be developed beyond those identified for the 10-hour course, CBR proficiency will increase only in the quality of performance. Practice in integrated training is the only real opportunity for improvement, and this emphasizes the need for making the integrated situation realistic.

The lack of use of live agents of some kind has been reported. Also noted has been the necessity for borrowing gas masks for field exercises

requiring them. Until such time as live agents can be used in field training and a practical means of identification can be given to each soldier, CBR training problems in troop unit training appear to be outside the scope of additional training aids.

Instructors in unit training uniformly express the conviction that, given satisfactory conditions of training schedule, personnel assignments, and training management, they would be able to develop and maintain their concepts of individual and unit standards of proficiency without difficulty. With the exception of the use of agents and their identification, the staff is inclined to agree.

Instructor proficiency in the use of training devices merits attention and improvement. A demonstration of power-driven decontamination equipment involved lecture and instruction by the instructor. His explanation of the use of an accessory water heater included the adaptors (nozzles) for use with various fuels. These small items were held up (supposedly "displayed" but concealed by the instructor's fingers) for a group of men on bleachers 30 feet away to see and remember the appearance and size of holes in the fittings which characterize their use for various fuels. For this procedure, large scale models are indicated; but the training can be given successfully with the real articles and without the use of any other aids by labeling and circulating the parts among the group.

This exercise, not CBR in nature, illustrates a training aids problem in giving CBR instruction to company size groups—the need for enlargements of masks, M5A1 and M9A2 kits, and similar items of CBR field equipment. The real objects as training aids should be in the hands of trainees while

the instructor uses the large model, "breadboard," or pictorial chart, with the smallest component part being large enough for good visibility from the back row.

A small variety of CBR training aids is stipulated for advanced individual and unit training. Among six CmlC troop unit ATP's, three CBR training aids are common to all tables of unit equipment: The M9A1 Protective Mask; the M9A2 Cml Agent Detector Kit, and the M-1 Portable Decon Apparatus. Five of the six units have an M-5 Paint Spray Respirator. ATP 3-201 adds a Smoke Generator. ATP 3-202 includes the Respirator plus seven other items. ATP 3-203 adds a Tachometer and M1A1 Maintenance and Repair Set. ATP 3-204 adds an M-12 Sampling Kit, an M-8 Mask Repair Tool Set, and a PD Decon Apparatus. ATP 3-205 adds an M-8 Tool Set and an M-2 Clothing Impregnating Plant. Thus, the T/O & E of the Chemical troop unit provides for the real item of CBR equipment in training at the advanced individual and troop unit levels, and the trainee has an opportunity to work with and learn to use his actual equipment rather than to look at it as he did in basic training, provided he is given this equipment.

The POI's in School courses devote about four pages to a list of training ammunition, although "Allocation of Ammunition Requirements specifically for this course is not authorized"; yet there is no list of training aids in the POI. FM's, TM's, AR's, and SR's are listed as references. In some instances a TF is identified in Type of Instruction or Scope of Instruction. Occasionally a training aid is identifiable as being the title of a lesson plan. In most periods, however, the individual lesson plan identified by code number must be examined to determine the training aids required.

Training Aids in CmlC School Courses

In the Chemical Corps School at Ft. McClellan the CBR training aids situation differs from those in basic training and troop unit training. Supporting CBR instruction in the School are: a training aids design section, a training aids production shop, a training aids distribution center, an efficient classroom support section, a research and analysis section, and a program of training aid evaluation.

Because of the forceful impact the quality of instruction has upon the way School students will instruct in the future, and because the School is the "professional school" for CBR instructors, CmlC School and CCTC should always be staffed with the most highly skilled instructors that can be found in the Chemical Corps. Instructors tend to teach the way they are taught. The less professional teacher training an instructor has had, the more likely he is to imitate his teachers, good and poor. Thus, training errors resulting from misuse of a training aid by a school instructor are likely to be perpetuated and compounded as his students become instructors, and the converse is true. This crucial problem is recognized occasionally in the military services:

First, the instructors have to understand this important role which only they can play. Second, they need to be given the status sufficient to play that role and should look to the day when the responsibility of instructing others becomes one of the great honors that can be paid a man in the Air Force. We recognize the practical difficulties in the way of holding instructors beyond a limited period of time (although possibly they can be held longer than they are at present) but we do believe that men selected for duty as instructors anywhere in the Air Force should be the "cream of the crop."¹

1. The Instructors Journal, USAF Air Training Command, Summer 1954, p. 151.

It is interesting that the military agency expressing this point of view reports as "satisfying accomplishments": development of a career field for airman instructors; development of an identification system for airman and officer instructors which recognizes teaching ability as their primary qualification; and the establishment of three-year tours for officer instructors.²

CmlC School will always require a continuous program of evaluation and improvement of instruction. This is true of any permanent educational enterprise. Skill in the use of training aids is susceptible to improvement. A wide variety of good and poor practices was observed. It is not his fault but it presents a problem to the instructor when an approved training film is designed to consume the entire period. There can be only limited discussion of points to look for prior to the showing. There is no time for discussion, for re-showing important segments, or for follow-up into another subject. In such cases, the instructor must either skip a considerable portion of the film, possibly omitting important parts, or he must allow the film to displace the instructor in the training process—a violation of expressed training doctrine. Numerous examples of this difficulty were observed. Training films frequently are too long, receive too little advance briefing, and are given almost no follow-up or critique.

There is a contrasting lack of use of filmstrips, whose very strength is a solution to the foregoing problems with training films. Nowhere in the CBR training program has there been seen a simple-to-make, economical, locally developed filmstrip in color to bring to the classroom the practical aspects of field situations. A good training aids section can make up

2. Ibid., p. 141.

filmstrips in color, interspersing pictures with titles or questions or outlines.

In contrast, the development of "graphic arts" aids appears to monopolize most of the Civil School training aids program, with the exception of motion pictures and a few transparencies or visual casts. The charts are usually wall-size, although the standard GTA size would be adequate for classroom use. Interestingly, the Army supplies Army-wide CBR training centers with GTA 3-1, 33" x 42", when training is outdoors in groups of 200; whereas, the School uses "company-size" charts about 60" x 96" in an indoor classroom for groups of 50. In addition to the numerous charts, there is extensive use of blackboard (with no colored crayen), Venetian blinds, and similar graphic visual aids.

Fundamentally, the graphic aids used merely present to the class the same topical outline, list of steps, and classification that appear in the lesson plan. The chart usually is read aloud by the instructor, and gives the student nothing that a mimeographed handout for his own notebook could not give. Errors in spelling occasionally detract from the aid the chart renders.

Judicious use is made of actual items of CBR equipment: protective mask; M5A1 kit; M9A2 kit; detector paint, paper, and crayon; radiological detection apparatus; syrette; ampin; and impregnated clothing. Models, cut-aways, and mock-ups of CBR munitions are used to teach the mechanism of ignition devices on grenades and smoke pots, and packaging or loading of aerial incendiary munitions, and the like. The use of these devices is effective.

At the School, where the NICE TO KNOW in basic training and the SHOULD KNOW in unit training are considered to be MUST KNOW knowledges and understandings, principles and theories involve a great deal of abstract and verbal learning. With limited and varied backgrounds, students experience difficulty in gaining a clear understanding of the technical bases of CBR warfare. Illustrations are to be found in the learning of nomenclature of agents, the "unsystematic" system of symbols, the theories of radiation, and others. A coding and naming system for chemical agents now under study would simplify a CBR training problem everywhere if the practical problems involved in the change make it feasible. Field proficiencies in CBR warfare required of officers trained in School courses probably do not involve a knowledge of the magnetic or electrical deflection of radiation, the differentiation between alpha, beta, and gamma rays, the balanced chemical equation for the oxidation of sugar, and the like. A reduction in unnecessary information in School courses, the NICE TO KNOW kind at the highest level of field proficiency, would eliminate most of the learning problems not now solved by proper use of available training aids.

Obsolete aspects of CBR warfare training films and inconsistencies in doctrine are impediments to learning at the School. The project staff was represented at the GTA Annual Conference held at Ft. McClellan in January, 1954. The problems of obsolescence and the scheduling of revisions in FM's, TM's, TF's, and GTA's were extensively explored at this conference. Production schedules were agreed upon for 1955. Two episodes, perhaps minor but extremely interesting, were observed. During training the project staff saw TF 3-1164, Construction of Gasproof Shelters in the Field, and

considered it to be not only poor in quality but also based on questionable assumptions. The evaluation of the School staff, as reported to the conference, was a "good" rating. Yet the instructor who teaches this subject in CBR warfare training so effectively pointed out the obsolete elements in the film that it was scheduled for revision. One wonders about the validity of film ratings by the staff.

Near the end of the conference one senior CmlC staff member asked the group chairman, "What GTA's are needed in areas that have not been included in the 1955 schedule?" The answer was, "No idea."

These two observations cannot be interpreted as indications of negligence or indifference on the part of anyone. Instead they are direct answers to preliminary questions drafted by the staff prior to the conference:

1. How does the "word" on new CBR developments get into post cycle training?
2. What agency in the Army searches for, assembles, and circulates on a positive, aggressive basis the good, successful, improved practices in CBR training?
3. Is there a central reporting agency outside the Chemical Corps where local field exercises, bivouacs, and maneuvers are reported in such a way that CCTC can have observers present to appraise the effectiveness of CBR training? Or so that the "habitual" inclusion of CBR situations can be confirmed and evaluated?

4. Who supplies this annual conference on CTA publications with the fundamental training research data on which to base judgments regarding need, justification, and utilization?

The answers to these questions are typified by the round-table poll of personal opinion that decided that TF 3-591 and TM 3-230, the Horse Gas Mask, should be continued on the active list of CBR training aids. The observer is not competent to question the correctness of the decision reached, but the absence of any justification based upon research is disturbing.

One question not yet clear is the implication that the tactical use of the 280 mm. weapon may necessitate CBR training, possibly requiring training aids, beyond the display of maneuverability in a newsreel type of film. Nowhere in CBR training has the staff heard any discussion of the HE effects or RW effects upon troops and their individual and unit protective actions. School CBR training and training aids should keep abreast if not lead in the application of new R & E developments to the content of School courses. New knowledge percolates too slowly into CBR training.

A final observation on training aids is the discrepancy between the potential value of a sand table in teaching the effects of atomic bursts and the fact that nowhere has a sand table been observed in CBR training. Field behavior of chemical agents probably is subject to sand table demonstration and discussion. Officers and students trained in a school where sand tables—or any other devices—are not used are not likely to utilize them effectively on their own jobs.

School course units on Training and Training Management should include both technical instruction and practical exercises in the values, limitations, and employment of each type of Army-approved training aids.

Conclusions Regarding CBR Training Aids

Army training policies governing training aids and their uses are generally sound. Aids are regarded as being important but not as influential as the instructor. FM 21-5, Military Training, says, "Training aids are not used for eyewash; they serve a definite training purpose."

In terms of design, the following principles are especially pertinent to CBR warfare training:

1. Every effort should be made to promote realism. The aid should involve the trainees, emotionally and psychologically at least, in a situation which is as nearly as possible a duplicate of what they are likely to face.
2. Aids should be kept simple. Unnecessarily complex aids tend to confuse and to obscure important points.
3. Aids should be durable. Outdoor use normally requires more durability than indoor use. Basic training and unit training aids should be usable outdoors.
4. Aids should be easy to use. Relatively unskilled instructors should be able to use most aids. Aids serve the same purpose in helping the instructor to teach and the trainee to learn.
5. The real object is frequently the best training aid. The best training aid in learning about protective masks is a protective mask.

6. Aids should be designed with the slowest learners in the group in mind. The concept of "minimum standards of proficiency" establishes a goal for minimum learning.
7. Training aids should encourage active participation of the trainee. Use of the devices should involve physical contact by the slow learner through operation, manipulation, or merely handling.

The lag between principle and practice is as wide in the use of CBR training aids as it is in training procedures generally. The following generalizations are based on observations and interviews in CBR training centers:

1. Several of the aids prepared for Army-wide use are of doubtful quality and usefulness. The best example is GTA 3-1, a series of platoon size charts which are standard aids for the 10-hour course. The charts are of limited value at any level of training observed by the project staff. They are prepared on paper so that they are quickly destroyed if used outdoors; they are bound in such a large collection that they are unwieldy to handle; and apparently they are produced with little consideration of the outdoor conditions under which centers providing basic CBR training operate. Furthermore, the charts are not accurate (perhaps changes in doctrine have merely outdated them) and they contain so much detail that their value is questionable. Instructors probably realize their limitations, and GTA 3-1 was rarely used during training observed by the project staff.

Films, too, which were viewed by members of the staff are frequently rated low in quality. Mistakes in performance, obvious even to members of

the project staff with little or no previous acquaintance with CBR training, are observed in many films which are shown, including the one produced at the Chemical Corps School. Furthermore, the films are too long, and they have been made obsolete by changes in doctrine. In only one film is there any real attempt to involve the trainees emotionally in the setting—the film showing troops in the Yucca Flats explosions. Even in this "better" film there is much nonessential material which could be deleted, especially for the particular purposes of CBR training.

2. Locally-prepared aids vary tremendously in quality and quantity.

Because few aids are available through central sources, training officers generally rely on aids produced locally (except for training films). The project staff is impressed by the resources which are available in Army areas for the production of aids, and is surprised that better use is not being made of these centers to improve CBR training aids. Obviously, officers responsible for training do not have sufficient experience in recognizing training problems to help them identify needed aids. A qualified person or persons should be assigned to visit every major CBR training center periodically to see at firsthand the training problems which exist, to help instructors recognize these problems, to encourage them to devise training aids, and to promulgate through a newsletter or other publication specific data regarding aids which may be produced locally and the uses to which they may be put.

Some of the best aids which were seen in use were prepared locally. In the judgment of the project staff, whenever an aid is prepared locally, plans and specifications or a duplicate copy should also be transmitted to

a training aids section of the Office of the Chief Chemical Officer. This section should screen such aids for ideas which perhaps should be given wider dissemination.

3. The best training aid available--the protective mask--is not issued as standard equipment. Tables of allowances for training equipment do not permit the issuance of a mask to each trainee--a mask for which he is responsible and with which he lives during basic training. Even in unit training, allowances are so limited (one mask for every two men) that battalions must borrow masks whenever a field exercise is contemplated. In the judgment of the staff, no single change in Chemical Corps training is needed quite as much as a mask per man. Every inspection should include inspection of CER protective equipment. Every man should be taught his mask will either keep him alive or give him a false sense of security. Every man should test his mask in the gas chamber. Every man should know that his mask is properly adjusted for immediate use.

4. Throughout the Chemical Corps (and especially at the Chemical Corps School) a tendency exists to overuse visual casts and charts. There is little doubt that well-prepared aids of this type can be very effective, especially for classroom instruction. Because men who were trained at CmlC School are responsible for much of the instruction provided throughout the Army, the instruction they receive at the School should provide them with experiences with aids which are usable in the situations they are likely to face. In one basic training center which was visited, not a single visual cast could have been used at the time because all of the training was conducted outdoors in daylight hours.

The visual casts which are utilized vary tremendously in quality. They are usually prepared by civilian artists with no background in training problems and with little understanding of CBR doctrine. As a result, details are likely to be an "artist's conception" of what to do rather than a clear example of the SOP. Some contain misspelled words, have little appeal to students, and are of little practical value.

5. Projection equipment for outdoor use is not provided. Since much of the CBR training is conducted outdoors, either project equipment should be designed which will work effectively in the open, or the program should be designed without the use of any projected material.

6. Not enough use is made of large-scale three-dimensional aids. Currently, considerable use is made of real objects in training—but in many instances the details of the object which are pointed out are so small that it is impossible for any except those in the front row to observe the features being described. Large mock-ups and cut-away models are needed in a number of instances and at different levels of training. No use is made of sand tables in CBR training, as far as could be determined. It seems that sand tables or a small area of fairly sandy ground could well be utilized, especially in problems involving tactics.

7. Training aids help most by requiring action from the men. Most aids which are now used merely present something—information, an outline of action which should be taken, a picture of something which has happened, etc.—and the trainee is regarded as a sponge to soak up needed information and skills. The project staff believes that proper action in CBR situations requires more than "know-how"—it also involves practice and drill. Aids, therefore, should focus the attention of trainees upon doing aspects—and

knowledge should be looked upon as necessary for proper action only. Too many aids at present seem to regard knowledge about CBR agents as valuable apart from action required in the field. For a few research personnel such a position is valid—for the great mass of Army officers and men, knowledge applied to effective action is the goal of instruction. Aids should, therefore, require action of trainees whenever practical and feasible.

8. Not enough use is made of simple, available aids. Chalkboards (portable or otherwise) are available or could be available at any installation. The chalkboard can be used effectively in certain aspects of training—especially if colored chalks are utilized. Yet, a staff member observed one officer attempting to teach the standard marking system for chemical munitions by using a chalkboard and white chalk. Trainees illustrated proper markings for different munitions by drawing examples and writing the names of colors. Colored chalk certainly should have been used for such an exercise.

The most conspicuous training aid, available on any base but rarely used, is the outdoors itself. Trainees have little opportunity to practice protective actions in the field, to mask while advancing through a wooded area in a prone position, to avoid and/or cross contaminated areas, or to undergo surprise attacks of various types when in a situation affording a good chance for correct action. When little use is made of the outdoors except to construct bleachers on which men may sit, the instruction might better proceed inside.

9. Uniform minimum standards for the 10-hour course and the POR course require standardization in the use of training aids and instructional procedures. The project staff realizes the importance of developing initiative

on the part of the instructor for effective teaching, but believes that the 10-hour course and the 2-hour POR training should be packaged—with lectures, aids, and procedures carefully prescribed. If competent instructors were always available, the suggestion would not be defensible. The practical nature of CBR basic training problems leads to the conclusion that anything less than complete standardization of these two courses will inevitably fall short of reaching desired standards of proficiency in the field.

10. The sources of supply of CBR instructors in the Army are strategic places to provide more supervised practice in teaching with training aids. Skill in the use of aids is a much more significant element in instructor competence than it was in 1940, but it requires specific training for its development.

11. To be acquired on the job, techniques in using training aids require technically competent supervision and guidance which CBR instructors are not now receiving. The project staff believes that this upgrading should be a field service rendered by a training command, and that it can operate effectively if conducted through direct channels that give direct contact and support to CBR instructors everywhere.

12. So much emphasis is placed on training aids in military training that their exaggerated "magic" hides the limitation that they are successful only as they help the learner to succeed. It is instructor skill that makes training aids most useful. Army training doctrine recognizes this principle, but enough observations have been made of its neglect in practice to show the need for remedial measures.

13. The firm judgment of all members of the project staff is that lack of good training aids is not the real cause of any significant lack of training success in CBR warfare. The training aids program needs improvement, especially in instructor techniques. However, increases in CBR field proficiencies are not likely to occur until training problems are solved through improved training management Army-wide. Neither devices nor the Chemical Corps alone can solve them.

Recommendations

1. A series of colorful, forceful posters should be prepared for Army-wide distribution. They should portray CBR actions and proficiencies.
2. A kit or case should be fitted with a standard list of CBR training aids designed for the 10-hour course. The set should be made available to any Army unit.
3. A series of CBR filmstrips should be prepared in color, portraying CBR field situations and providing for critiques and self-testing exercises.
4. A series of short CBR training films, lasting from three to five minutes, should be developed especially for unit training. Each film should include the essential preview and follow-up discussion. The series should present a wide variety of CBR field situations requiring individual and unit action.
5. Means should be provided for individuals to time themselves during gas mask drill.
6. A series of combat pictures showing CBR situations should be developed for automatic self-rating devices if these are available to Army establishments.

7. Encouragement should be given to the development of outdoor visual projection during basic and advanced individual CBR training.

8. A permanent foxhole, well designed for protection against RW, should be constructed in the CBR training area at each basic training center, and each trainee should be required to take cover in the foxhole at some time during basic training.

9. The Army should establish a positive system of exchanging CBR training aid "ideas" among training centers and units. A CBR training aids clearinghouse and newsletter should be involved.

10. Gas masks should be issued as items of personal equipment during basic and advanced individual training.

11. A defensible and adequate procedure should be established for determining need and justification for CBR publications, based upon study and research within the Chemical Corps.

12. Specific training and practice in the use of training aids should be incorporated in every program that qualifies Army personnel as instructors in any phase of CBR training--basic, advanced, individual, unit, and School training.

Section VIII

CBR PROBLEMS OF GENERAL INTEREST

This section gives consideration to two major problems that are not properly parts of the foregoing sections but are important concerns in CBR training. The first problem is that of measuring the success of CBR training. The second problem is the administration of CBR training. The characteristics of good test items are reported, and CBR proficiency tests are evaluated on the basis of these test criteria. Then twelve recognized principles of training management are described, and CBR training practices are evaluated on the basis of the twelve principles. This final section concludes with recommendations for the improvement of CBR training management and the measurement of training success.

The Success of CBR Training

In evaluating the effectiveness of a training program, one of the first and most important tasks is that of identifying the traits that distinguish a person who is well trained from one who is poorly trained. Once these traits are identified the next problem is that of determining whether the training program is producing the desired results. Even if the trained product is satisfactory, there may be some concern over the most efficient means of obtaining the desired effect. Evaluation of a training program or of a specific training aid must be made in relation to criteria of proficiency.

Criteria of training success have been differentiated professionally into three categories: ultimate, intermediate, and immediate.¹ The ultimate criterion of training success is the final objective of the training program. In the CBR phase of basic training, the ultimate criterion applied in combat would be that the men would survive a CBR attack and that under such conditions the men would be able to carry out, in an effective manner, their primary missions.

Intermediate criteria are those that can be applied during advanced stages of training or during the performance of a task for which the person is being trained. An example of an intermediate criterion is the performance of the men on the Army-wide CBR proficiency tests conducted during February and March. Another example would be the behavior of the men during CBR phases of Operation Flashburn. These intermediate stages are not as genuine as combat but are supposed to simulate it.

Immediate criteria are those that first become available and that can be applied during the course of training. Amount of knowledge at the end of a specific course or performance on an exercise during the training period would be classified as immediate criteria.

Since American troops, with the exception of those who were subjected to chemical attack in World War I, have never experienced CBR warfare, there is no way of observing in advance the ultimate behavior which will yield the proof of the effectiveness of CBR training programs. Thus, rational judgment is the only means of estimating the ultimate criterion.

1. R. L. Thorndike, Personnel Selection. New York: John Wiley & Sons, Inc. 1949.

Such judgment is usually based on the opinion of experts in the technical field. In this project these judgments have been made on the basis of information obtained from manuals of doctrine, POI's, training memos, and the like. The relative importance of each proficiency has been estimated in the same manner.

Appraisals of the effectiveness of a training program or training methods must, in actual practice, depend on immediate and intermediate criteria. These criteria provide limited approximations of the ultimate criterion; they are adequate to the extent that they approximate the ultimate criterion. The evaluation must frequently rely on rational judgment in estimating this relationship.

Criterion for Measures of Proficiency

According to Thorndike,² it is customary to evaluate a criterion or a measure in terms of its validity, reliability, objectivity, and practicality.

The first and most important of these terms is that of validity, also called relevance. A CBR proficiency test has validity or relevance to the extent that the skills measured by the test are similar to the skills demanded by the job. The fact that a person can mask properly during the gas chamber exercise does not necessarily mean that he will mask properly under actual CBR attack. Again, rational judgment must be used to determine the amount of relevance. Thus, it is important in

2. Ibid.

constructing tests that the various aspects of the ultimate criterion be kept in mind, and that immediate criteria resemble the ultimate as closely as possible.

In all probability the Chemical Corps will rely mainly on immediate criteria; i.e., performance during or at the end of training courses, in assessing the success of the CBR training program. Some individuals or unit will receive tests in the field or will be included as a part of a sample in a special testing situation such as the last Army-wide proficiency tests. The majority of the men, however, will not be tested again in CBR warfare after their 10-hour training period test. A few men will miss even this test due to extra duty, sick call, etc. Thus, extraordinary care should be devoted to the development of these immediate measures.

Proficiency tests designed to assess knowledge at the end of a training period are usually based on the content of the courses. This practice is not necessarily undesirable if the content of the courses is relevant to the ultimate criteria. If course content is unrelated to the ultimate criteria, a favorable showing on a test designed to measure knowledge of that content may result in much unrelated material or "fluff" being retained in a training program. In other words, proficiency tests based on course content provide little or no basis for curriculum revision.

A more effective procedure would be to design proficiency tests to measure identified elements of the ultimate criteria. These criteria or proficiencies, as identified from official literature, are grouped as follows:

1. Recognize that a CBR attack is in process or has occurred
2. Identify the agents employed
3. Use available protection properly
4. Administer self aid or first aid properly
5. Decontaminate self, equipment, and terrain
6. Execute SOP for exploitation, continuing mission, etc.

In designing proficiency measures for CBR, the quality of response elicited is of paramount importance. It is relatively unimportant, for example, whether a man knows self aid if it is too late for the self aid to be effective. Thus, in assessing proficiency, consideration should be given to factors such as the following:

1. Prompt decisions. The speed with which G agents act does not permit much time to haggle over the proper procedure. Survival depends on whether the correct response is given within the maximum time limits. In Operation Flashburn a regimental commander spent the better part of an hour trying to decide the proper procedure following an aerial spray attack. Then the action which was finally taken was the pooled judgment of several officers, including the umpires.

2. Proper sequence of behavior. This would involve sounding the alarm, taking protective action, recognizing symptoms, self or first aid and decontamination, reporting attack, and continuing mission. Effective first aid or self aid, for example, depends on the proper recognition of the symptoms and must follow identification but precede decontamination.

3. Efficient effort. During "Flashburn" several men were observed to panic when a purported CN-DM spray fell down their necks. Disorganization soon spread throughout the company. It is important that all efforts be carried out in the most expeditious manner.

4. Proper exploitation of mission. It is important that the behavior proficiencies outlined above be elicited in such a manner that there will be a minimum of interference with the primary mission.

Second, reliability is related to the variability of performance of individuals (intrinsic reliability) and to variability in the conditions under which the test or criterion measure is administered (extrinsic reliability). "Intrinsic reliability" is improved by increasing the number of behavior samples observed and by making these samples representative of the behavior of the whole group. "Extrinsic" sources of variation or unreliability may be partially controlled by standardizing the conditions under which the instrument or test is being administered. Giving the test to one group by playing a record and giving it to another group by reading it aloud would reduce "extrinsic reliability."

The third characteristic of a good criterion measure is objectivity or freedom from bias. Bias may be detrimental to both relevance and reliability. Bias may be due to subjective evaluation standards as when raters systematically use different standards in judging behavior. One rater might be too lenient, another too strict. It may also be due to certain external conditions. An example of the latter might be the failure of soldiers to become proficient in CBR warfare, not because of poor teaching methods and poor training aids but because the men are too tired to learn the material presented. Thus, any conclusions about the efficiency of training methods would certainly be biased.

Army personnel are in a position to make casual observations daily concerning the proficiency of the troops as far as CBR training is concerned.

The major reason for a proficiency test is to verify these observations. The test differs from casual observation in that the observations in the testing situation are made under standardized conditions. The test thus becomes somewhat like a laboratory experiment and therefore equal care should be taken to maintain experimental conditions.

Biases may be reduced in much the same manner that factors producing unreliability are reduced. In using criterion measures, care should be taken to insure that the effects of bias are reduced to a minimum, especially by providing a common basis or guide for judgments.

The last consideration for a criterion measure is that of practicality or the convenience and economy of the measure being considered. The decision as to whether a criterion measure is practical will depend on the best possible judgment as to the seriousness of the situation, other available measures, budgetary limitations, and the like.

Army-wide Testing

The Army-wide, individual CBR proficiency test, administered during February and March, 1954, has been analyzed in terms of the standards discussed above. The purpose of this analysis is not to be critical of the test but merely to illustrate an application of these standards. Actually, the test, as observed, provided one of the most effective training devices seen during the study.

Relevance. The behavior elicited by the test appears to approximate, in large degree, the various skills and duties probably required of the men if CBR warfare were to be used in actual combat. The test situations are particularly good in that the men are required for the most part to carry

out the activity, not merely to verbalize it. For example, the men are required actually to decontaminate their weapons and to remove simulated agents from the skin of their buddies. In a few instances, however, the men verbalize their action. After a simulated atomic burst the men are required to "state" two things which could have been done to reduce exposure to radiation.

The behavior elicited in the test situations, however, was in the nature of discrete isolated responses. How will the soldier behave when he has to respond in proper sequence to a much more complex situation? It is one thing to recognize a CBR attack is occurring when a spray from a low flying plane is pointed out; it is quite another problem when the men are pinned down by enemy fire and when several other planes are overhead strafing or laying down smoke at the same time. In making inferences about ultimate behavior on the basis of these immediate and intermediate measures, it must also be kept in mind that the primary missions must often be continued under any CBR difficulties that are encountered.

Reliability. The intrinsic reliability is probably quite adequate. A sufficiently wide range of behavior is sampled to insure a considerable degree of stability of results.

Whether or not the extrinsic reliability is adequate is doubtful. Some of the units spend several hours getting ready for the tests. The test scores probably are artificially high because of this intensive coaching and practice. A surprise retest would probably yield different results, for the real level of proficiency would be shown by the success with which units could respond without coaching and cramming. However,

the effect of the forewarning and the intensive preparation probably is the same for all units, and their relative standing may be unchanged. The test error resulting from the practice effect may be a "constant" error. All test results should be discounted to offset this constant error.

CBR attacks will probably occur without advance warning. The Army needs to know how the men will react to a surprise attack, not how much knowledge the troops can pick up in massed drill sessions held two or three days before the tests are given. This criticism would not be serious if an effort were made to keep the men at this peak of efficiency. There is no evidence that this is the case. According to reports from several officers and men, the various units promptly forgot about CBR warfare and began to prepare for a proficiency test in some other area.

Another factor affecting extrinsic reliability of the tests was the method of administering and scoring. Two of the OCAFF teams were observed in operation. One took great care in selecting and training the scorers. The other apparently considered this problem to be relatively unimportant. The care which went into the preparation of the tests would probably be somewhat negated by this lack of provision for adequate scoring procedure.

Bias. One of the officers in charge of a testing team gave credit for wrong responses because the troops had been taught the wrong procedure. He felt that it would not be fair to penalize a particular group because they had been taught incorrect methods. A scoring system should have been devised which would have eliminated this source of bias. Prior instructions might have eliminated this problem.

Practicality. Practicality of the test is excellent. It would be given to large numbers of men at the same time. Equipment required is simple, inexpensive, and fairly easy to design.

Analysis of ATT 3-2 (Selected at random)

Relevance. This test appears to be a particularly good measure of intermediate criteria. The test is designed as a very practical field exercise with the chemical phases of the operation integrated with enemy attack, marches, bivouac, preparation for defense, etc. The test seems to be measuring adequately the performance of a company operating under conditions which are fairly similar to actual combat.

It is difficult to determine whether the ATT's measure completely the objectives of the ATP's. Objectives and desired proficiencies are not spelled out; they must be inferred from the content of the ATP. The omission is not a serious criticism of the ATT, however, as the test is more concerned with ultimate criteria than with program content. The test cannot be evaluated as a measure of the thoroughness of the ATP.

Reliability. The test samples a sufficiently large number of situations to insure a fair degree of stability. A company is rated on a total of fifty-one different items since these tests are administered as field problems. Variations in weather conditions, terrain, etc., are unavoidable. These variations, however, will tend to decrease the reliability of the test results. Also, the scoring is done by means of pooled ratings of at least two umpires. The fact that many of the items to be rated are stated in an ambiguous or vague manner, e.g., "Defensive measures during attack," will tend to lower the reliability.

Bias. Variations in testing conditions and the scoring procedure provide opportunity for biases to affect the outcome. Elimination of variations in testing conditions will be virtually impossible; they may be reduced, however, by offering suggestions as to the site for the test, terrain, weather conditions, etc. The scoring procedure could probably be improved by setting certain limits as to the allowable responses and by offering illustrations of correct and incorrect responses. This would tend to reduce the ambiguities in the items to be rated.

Practicality. The test appears to be particularly good on this point. It requires no elaborate preparation. The umpires must, of course, make some advance arrangements for materials and equipment, but not on a scale which would in any way be impractical.

Evaluation of a Local CBR Proficiency Test

This test is very similar in scope and nature to the Army-wide individual CBR proficiency test described previously; thus, the remarks regarding the Army-wide test are pertinent here.

There is, however, one difference in that the Army-wide test attempted to interject more realism by the use of sound effects. The situations in the Army-wide test are described in more detail.

No score sheet was provided with the test; therefore, no comments concerning the scoring procedure can be offered.

Evaluation of Examinations from Chemical Corps School

Tests evaluated include Nos. T 035/E-R, 0015/E-U, 8450/E 70-R, T 762/E-R, 7929/E-70-U, 5786/E100-R, 2030/E, 3004, and 3128A.

Relevance. These tests measure course content. Thus, they are relevant to the ultimate criteria only to the extent that course content is relevant.

A major problem exists in determining what a passing or failing grade would be. If the tests are valid, this should be determined against some intermediate criterion.

Reliability. The tests are long enough to insure a fair degree of reliability. They range from about sixty to seventy-five items per test.

Bias. These tests are objective, which should reduce bias to a minimum.

Practicality. These tests can be given in a class period. They meet this standard very effectively.

Use of the Criteria

These criteria for measures of proficiency should be applied by instructors in every phase of CBR warfare training. They should govern: (1) the construction of tests designed to measure mastery of a daily lesson or a single skill; (2) the administration and interpretation of test responses; (3) the retraining that should always follow unsatisfactory test responses in a training situation; (4) the preparation, administration, and interpretation of tests at the conclusion of a training program; and (5) the preparation, use, and interpretation of proficiency tests whether used in bivouac, on maneuvers, in joint operations, or in Army-wide testing.

The application of these criteria during this project has highlighted the excellent quality of the OCAFF CBR Proficiency Test, and the variations

in administration by various teams that render any interpretations of results subject to question. Of greatest significance, however, is the revelation that good testing of training success is virtually nonexistent at those stages of CBR training where reteaching would be possible if learning difficulties were identified. Unless the Army is able and willing to drop a basic recruit back into a new group and have him repeat unlearned parts of his basic training, the end of the 8-week period is too late to determine that one man has not learned to clear his mask, another does not know decontamination principles, and another does not know characteristics or symptoms of chemical agents.

The good use to which the GCT is put in prognosis of background, interest, aptitude, and probable success is not reflected in CBR warfare training, where pre-testing should come early in advanced individual training, unit ATP's, and school courses. Nor are tests used as training devices during courses, so that both instructor and trainee, aided by this knowledge of the learner and his knowledge of results, will increase their training efficiency. Tests are not used to classify individuals and sections in CBR training in order to avoid the sheer boredom of the man who mastered the skill the first time and the hopeless bewilderment of the man who never will learn it. Tests are not used to distinguish the difficult-to-learn elements in a program from those easy-to-learn, as a basis for revising the training schedule, time allotments, course content, instructor assignments, training aids, and numerous other factors in training management. These criteria should be the basis upon which any efforts to improve training along these lines should rest.

Administration of CBR Training

As in most educational enterprises, there is a tremendous gap between what the Army knows should be done in training and what is done. Publications, especially FM 21-5 on Military Training, are in the main soundly based upon what is known about how learning takes place. Principles, recommendations, and procedures which are promulgated are in most instances defensible. On the other hand, training frequently violates the promulgated training doctrine. In some instances, the way the Army programs are designed makes it almost impossible for commanders to follow training doctrine. In other instances, facilities are such that programs are considerably handicapped and weakened.

Principles Endorsed by Army Policies

Effective CBR training will result when the Army begins to apply in a significant way the principles, such as the following, that are found in and are adapted from FM 21-5, FM 21-6, and TM 21-250.

1. Men learn by doing. There can be no learning without some activity by the soldier. The best activity is for him to practice doing the job that he is expected to learn. The project staff acknowledges that mental activity is activity—that men can learn by listening to lectures, by viewing films, and the like—but it states without reservation that the best way to learn how to use protective ointment is to use it under adequate supervision and guidance.

2. Men differ in ability, in experience, in desire to achieve, in emotions, and in physique. Any program which purports to teach the same skills, understandings, and dispositions to act to each of a group of men

must therefore be planned so as to capitalize on the differences which exist among men by differentiating the instruction given them.

3. There is no substitute for a skillful instructor. Those most qualified to teach should be doing so. Each instructor needs to know his subject and possess qualities such as judgment, tact, initiative, enthusiasm, and endurance which the Army recognizes as being necessary for good teaching. He should be able to express ideas effectively. He should be a good example for the learners.

4. Readiness to learn is basic to good learning. Any person learns better when he needs and wants to learn. Readiness can be developed in men. When men understand why instruction is being given and when they see the reason for the instruction, they are more ready to learn.

5. Interest must be aroused and maintained for effective learning. A person learns those things which interest him—those things on which he focuses his attention and concern. If men are to learn how to carry out their mission in CBR situations, their interests must be caught and continuously held.

6. Exhausted men will not learn well. Training programs must be designed in such ways that achievement of objectives in certain parts of the program do not interfere with or prevent achievement of other equally important objectives. A man asleep on his feet is not likely to learn much about standard marking signs or field identification of war gases, even though he may be developing physical stamina.

7. Distractions interfere with effective training. Especially during times of presentation, it is important that men be able to hear and see

without difficulty. Constant interruptions, or other interesting events in the immediate area, will detract from the learning.

8. Men who are absent from training are not likely to learn what was taught. If each soldier is expected to know self and first aid for chemical casualties and how to don a mask efficiently, he should have such instruction. Proficiencies should not be expected from soldiers who miss training to police an area.

9. Students can assimilate only a limited amount of new material in a given time. It is not by chance that undergraduate and graduate colleges and universities in the United States generally provide instruction on the basis of approximately a four-hour day of organized learning activities.

10. Knowledge of progress or proficiency supports learning. As men discover that they are becoming more proficient—on the range or at donning the protective mask—they try harder to improve their own records. The same principle applies to groups of men at the unit level.

11. Planned, sequential experiences are necessary for effective learning. Reliance upon incidental learning or upon a potpourri of activities scrambled together is almost sure to result in inferior training. In an organization as large as the Army, with many nonprofessional teachers responsible for instruction, this factor is particularly important.

12. Behavior in the field is the best test of the training program. The training program in CBR is designed so that each individual and each unit will be capable of carrying out assigned missions with the least loss in combat effectiveness. Whether or not the training program is developing the proficiencies needed to achieve that objective can be tested

only in actual field situations. Paper and pencil tests cannot be satisfactory measures of proficiency.

The Application of Principles to Practice

These twelve basic principles of effective instruction are, in many ways, ignored or unheeded in actual Army training although they are enumerated effectively in training publications. In the following sections each of these principles will be developed in greater detail and specific examples will be cited to indicate how present instruction is not as effective as it should be if training objectives are to be realized.

Men learn by doing. Effort is consistently being exerted to involve men actively in training programs as participants. The gas chamber drill and the applicatory exercise outlined in Training Memorandum No. 7 are evidences that the need for more "learning by doing" is being recognized. At all levels of training, however, the basic medium of instruction is still the lecture. Three obvious examples of ineffective training were observed:

1. Men who are supposed to be able to provide self aid for themselves in case of an attack using G-agents only touched a syrette which was quickly passed down the line during the lecture. They had only the briefest contact with this instrument; yet they are expected to perform at a high level if ever they begin to feel the symptoms described by the lecturer.
2. Men who were learning the complicated marking system employed on chemical munitions were told what the colors were, and the blackboard was used to illustrate placement of the symbols—but the marks were made with

white chalk on a black surface. No munitions were present during the lecture. No colors were in evidence.

3. Men were being given a proficiency test in CBR warfare. They were individually required: to answer verbally, "What are the three ways that germs can enter the body?"; to describe verbally the action they would take if they saw a brilliant flash of light without any prior warning of the imminence of atomic attack; and to mask on signal, a small group at a time. No difference was made in the score assigned whether or not equipment fell to the ground during the masking. No stop watch was used to determine the length of time required for masking. No surprise or unexpected masking was required while firing, while advancing in a prone position, or under like conditions. The scores which indicated "proficiencies" varied primarily on the basis of the verbal answers--and the only way to determine whether the man who responds correctly verbally will respond correctly in a field situation is to test him in a field situation.

Men differ in ability, experience, motivation, emotions, physique. In the training programs observed, every man gets the same learning experiences regardless of his background, ability, and motivation. Persons with undergraduate degrees in bacteriology sit through sessions on simple terminology with which they are completely familiar. Persons with years of experience in the Medical Corps patiently listen while information is presented which the medics obviously know better than instructors. Persons with battle experience in Korea sit next to soldiers of about ten weeks' experience--both being given the same film or the same lecture. Men with college degrees receive instruction with soldiers who are almost illiterate.

The list can be extended. The Army does not group men for instruction even though it is recommended in Paragraph 65 of FM 21-5. Consequently, most of the training is geared to the slowest vocal member of the group. The brilliant persons quickly become lazy or defiant. Men differ, as training doctrine clearly recognizes, but training practice does not, and any training program which fails to provide instruction geared to the differences will operate at an inefficient level.

Skillful instructors are essential. The Army recognizes the importance of the instructor in the training program. In spite of official recognition of the need for effective instructors, however, Army practice is based upon the theory that anyone who has a stripe or a bar can teach with skill proportioned to his grade or rank. When the committee procedure is utilized instruction generally tends to be of higher quality than in units, because the instructors are specialists with particular responsibility for training. When the training falls completely upon the commissioned and noncommissioned officers of a particular unit, CBR instruction is not likely to be of high quality because of the other duties of the officer group. One example which was observed will illustrate the low quality of some of the training provided in units: A lecturer was describing how the unit will proceed through a contaminated area if one is encountered, and he mentioned a "shuffle box." At the conclusion of his lecture one man asked, "What is the function of the shuffle box?" The NCO instructor stalled by hemming and hawing, not knowing what "function" means, until saved by the commissioned officer present who restated the question: "What do you use the shuffle box for?" The NCO then gave an acceptable answer. The box itself was not demonstrated.

Until such time as assignment to training duty is looked upon as choice duty in the Army, and until such time as assignments to training duty are of sufficiently long duration that excellence can be developed through good supervisory help, the Army is not likely to have many skillful instructors. Not everyone can teach effectively and to assume so is to lower the quality of training considerably.

Readiness is basic for learning. Even though manuals recognize the basic idea of "readiness to learn," many instructors in Army training programs seem to believe that all that is necessary to involve men in active learning is to: (1) write on the board—if one is present—the instructor's name, the subject to be considered, and perhaps a word or two to indicate the nature of the hour's work; or (2) to define some basic terms or to state three basic principles. Men are not necessarily ready to learn, however, everything that the Army wants to teach. In fact, some men seem almost willing to resist the instructor's effort to teach them anything. An organization which receives men who are drafted against their will must provide experiences which will make men want to learn. In the case of CBR training, survival is the basic motivator—or could be if properly utilized. All persons who are not mentally unbalanced or in extreme pain desire to keep on living. Dramatic ways of demonstrating the effects of CBR warfare should be developed and used so that men will want to learn what they need to learn about CBR. Little is now done except to cite some verbal examples from the history of World War I. The use of a film on the difficult subject of the effects of agents is forbidden as being "too realistic."

Interest has to be aroused and maintained. Even though a man is interested in survival and, therefore, in learning about CBR protective measures, he is not likely to learn much unless the instruction is provided in an interesting and challenging manner. Interest is highest when participation in CBR situations is imminent. Men who are preparing to enter the gas chamber are alert to learn every suggestion that may help them understand what they are facing and what they should do. Men who are preparing to have some blister agent (probably simulated) placed on their wrist for a buddy to decontaminate properly are interested in learning exactly what to do so they won't be burned. Even men who are highly motivated, however, lose interest when a voice drones on and on without interruption, change of pace, or requiring activity on the part of the listener.

In spite of the fact that many men are fundamentally not really eager to become the best possible soldiers, the Army is in a particularly fortunate position as compared to a college or university because much of the material to be taught can be taught utilizing firsthand experiences. Many such opportunities are now lost--too much reliance is placed upon low-interest, soothing types of instruction such as lectures. Interest can be aroused by involving men in the training, by having them face many problem situations similar to ones they may someday meet in the field, by using live and simulated agents much more frequently than is done at present in occasional demonstrations and pseudo-activities.

Exhausted men are poor learners. The Army recognizes officially that the "toughening up" process may get in the way of effective learning, and

official publications recommend extra rest time on mornings after night training if instructional phases of training are scheduled. In practice, however, the pace of the program—especially in basic training—is so exhausting that even cadre personnel who have considerable Army experience fall asleep almost immediately when they sit down for a lecture indoors. In practice the Army attempts to make good learners out of tired men by having someone constantly acting as a spotter—asking men who doze to stand at the side or rear of the room during the rest of the lecture.

It is obvious to any critical observer that the Army could teach a great deal more in the same length of time and have it retained longer if the men were alert rather than exhausted. It is no wonder that proficiencies are not developed adequately. CBR training suffers as morale drops and as physical vitality is lowered. The gain in endurance, in obedience, or in any other desirable outcome of this schedule is at the expense of CBR knowledge and other forms of "passive learning."

Distractions interfere with training. Official statements in Army training publications recognize that the physical environment is important if training is to be effective. Many examples could be cited to indicate that the gap between theory and practice in Army training is especially wide at this point. At one base certain parts of the program are scheduled on bleachers out of doors regardless of the weather—rain, snow, or shine. These portions of the program are essentially lectures. Indoor classes are absolutely essential in bad weather unless the effectiveness of training is to drop markedly.

Absent men don't learn. Men who are absent from training programs may learn—but not what the training program prescribes. They may learn how to peel potatoes or pick up cigarette butts—and the project staff recognizes that such activities are essential parts of a total Army program—but they do not learn what the CBR training program is designed to teach. Probably no practice observed by the project staff contributes more to ineffective training than placing a percentage of men on duty resters every training day. Yet this is standard practice in spite of the pertinent comments in FM 21-5, p. 26. Unless the length of basic training can be increased by one week without an increase in the training load so that an entire unit can be given duty tasks on the same day once a week, the training program should be ruthlessly cut to seven weeks of training in an eight-weeks' period so that the same possibility will obtain. Every soldier is entitled to CBR training—and to other survival training. It would be better to cut the 10-hour course to eight hours, or perhaps even six, and have every man present than to maintain it at ten hours and have 5 to 10 per cent of the unit not receiving the training.

The practice currently followed makes it necessary for CBR training which is provided at the advanced individual training level to be almost identical with that given in basic training on the assumption that the same men will not be absent when the training is given the second time. But, on the opposite assumption that it might happen, most unit training in CBR starts at the same place—back with the simplest definitions and procedures. In the judgment of the project staff, such procedures are not defensible.

A limited amount of new material can be assimilated. There is little doubt but that persons of greater ability can learn more in the same period of time than those of lesser ability--but there are practical limits to the amount of material which can be learned by any person in a given period of time. The greater the amount of new or unusual content, the more difficult the learning is likely to be. Because of the nature of CBR content, a considerable amount of the program is "new" to the men. Most of them are able to grasp and remember only part of what is presented when the lecture (even when accompanied by transparencies) is the basic technique of teaching.

Army publications warn instructors about attempting to teach too much in a short period of time--yet at all levels of training instructors are needlessly complicating the learning task by including too much content in a lecture period. It seems to the project staff that, at least in basic training, the training program should be so carefully planned that the content load, as far as the trainee is concerned, would be kept to the minimum consistent with combat effectiveness. The total program, including lectures, should probably be developed centrally and carefully screened for nonessentials, verbosity, and sequence. Fairly complete instructions, including needed training aids and their use, should be included for training officers.

As long as persons who have recently completed advanced courses at the Chemical Corps School are primarily responsible for CBR instruction in basic training, the 10-hour course is likely to contain a considerable amount of NICE TO KNOW but nonessential information as far as the ordinary

combat soldier is concerned, because men generally teach as they were taught. The same problem exists for the instructor not trained at the School, who with untrained judgment as to difficulty and assimilation rate, prepares his lecture notes from technical manuals.

Knowledge of progress helps learning. Learners seem to get a lift from a realization that they are making progress. Such a feeling of pride in accomplishment carries over and affects other learning. The Army publications on training indicate that this learning principle is known, yet except at the upper levels of training little is done (or at least was done in the CBR training observed) to inform men of their growth or to provide situations in which they could clearly see the progress they have made. At the upper levels, the results of paper and pencil tests are primarily the means of measuring progress.

Skills are developed in a sequence of steps. Some consideration has been given to sequence in all Army publications outlining training, but in many instances—especially at advanced levels—the sequence is lost in a maze of scheduled activities. A program such as that outlined for basic CBR training in Training Memorandum No. 7 indicates that considerable thought has been given to the proper order of learning experiences in CBR. But little thought, evidently, has been given to development of a total learning program with sequence. There is, undoubtedly, a planned procedure in learning how to use the rifle effectively, in basic tactics, in first aid, and so on, but these sequences do not (as far as could be determined) affect significantly the CBR sequence.

The reverse is equally true. Sequence is provided within the segments of training as far as content coverage is concerned—but sequential experiences for the soldier are rare. He undergoes a program of pieces—each separate and distinct--each valuable in itself but basically not related functionally to the other pieces until a bivouac exercise helps him see how training in separate areas is applied simultaneously in the field. Training officers are aware of this problem, but scheduling difficulties—especially related to the use of facilities and space—make a disjointed approach seem necessary.

Integrated training should start much earlier in the training program. When some skill in masking has been developed and some skill in firing in a prone position has been developed, the two skills should be practiced on the range. When some skill in dismounted drill has been achieved, and mask drill has been provided, the alarm "Gas" should be given during drill. Men will not be standing alert and with their hands on the flap of the carrier in wartime waiting for the officer to sound the gas alarm. A proficiency goal of fifteen seconds for donning the mask, as doctrine currently indicates is standard, should be developed and maintained along with other duties and activities. This cannot be done when a man has a mask in his possession for only two hours during a basic training exercise.

At the Chemical Corps School the problem of poor sequence is particularly obvious. Course schedules jump from one topic to another with little or no obvious attempt to merge the separate aspects of training into a program which makes sense to the learner. The task the learner faces is, thus, needlessly complicated and the quality of training

consequently lowered. The project staff believes that much could be accomplished to improve the performance of officers and men in CBR situations if competent curriculum personnel carefully analyzed the total learning programs and reorganized present programs to provide more sequence for the learner. This is a task which would require constant effort over a considerable period of time.

Behavior is the test of training. The official Army publications all recognize that training programs are designed to develop skills, understandings, and attitudes which will result in specific behavior in the field. Training programs, on the other hand, provide little opportunity for officers and men to face problems and work out solutions—even vicariously. Pressure of time seems to convince almost all training personnel that lecturing and demonstrating must be the backbone of the training program.

The project staff, on the other hand, believes that since behavior is the test of training, every activity should be geared to the development of behavior. If lectures are used (and they will continue to be used because they frequently present needed information most expeditiously), the learner should be required to participate—to demonstrate behavior—which is supposed to result from the lecture. If behavior is not supposed to result, the lecture is undoubtedly superfluous and should be eliminated from the training program. If a film is used, it should be followed by (or, as is suggested elsewhere, perhaps be interspersed with) activity on the part of the learners to fix the learning—to demonstrate the behavior.

Much more use should be made of problem situations involving real or simulated agents, use of the equipment normally furnished the soldier, action which is required to utilize field expedients instead of ideal or make-believe facilities and equipment, and initiative based on analysis of conditions. The aim of instruction should be to develop a THINKING soldier who acts intelligently and speedily in various types of situations so that he will also do so if any enemy should use new or different CBR agents for which standard operating procedures are not effective. Such behavior is not likely to be achieved unless men are trained to face situations requiring action and demanding practical applications of their training experience.

Conclusion

Most of the subject matter in CBR warfare training comes from scientific knowledge developed in laboratory situations. Proficiency in modern CBR warfare has not been tested in combat. Most of the practical applications of technical CBR knowledge have been based on theory and reason rather than on field experience. The scientist has difficulty in translating his CBR knowledge into field requirements of the soldier. The soldier being trained for combat efficiency has difficulty in interpreting the subject matter the scientist tries to translate.

Just as the specialist with limited Army experience tends to exaggerate the importance of NICE TO KNOW information, so also does the Army combat veteran with limited scientific background tend to oversimplify CBR training and to underestimate the importance of MUST KNOW CBR skills. Battle experience in CBR warfare undoubtedly will bring these two groups of Army

personnel closer together in their understandings. It will give them a body of practical CBR subject matter of utmost value in training--if there remains time and opportunity to use it. In the meantime, solutions to the problems of CBR training must be sought through training management.

It is usually good administrative practice to delegate responsibility and commensurate authority for training success to the levels where training is conducted. The Army follows this practice in its training policy. However, the practice is sound only when responsibility for the supervision and evaluation of results is exercised to the same degree by the delegating authority. This the Army does not do. It is not good administrative practice to delegate to unit commanders the final responsibility for CBR training and also the final responsibility for its evaluation. Too many others have a stake in combat success to permit any unit commander to be the judge of his own competence as an administrator of training, and this appears to be the net effect of CBR training practice.

The Army has promulgated excellent CBR training theory and principles. Some of its publications provide excellent guidance toward CBR training success, especially for the instructor who is already most likely to succeed. The measures taken by the Army to improve the quality of CBR training operations, however, are less adequate, probably due to the fact that the coordination and supervision of CBR training activities is poor.

OCAFF is concerned with field proficiency and combat effectiveness. Just as the sergeant must train his men to use expedients in the field in contrast to TM's and laboratory techniques, so also must OCAFF exercise supervision over the way CBR training is conducted in the field in contrast

to the theories of training principles and doctrine. The job is putting theory into practice. The method is through improved training management. The product is a soldier capable of sustaining CBR attack and continuing his mission without reduction in his combat efficiency. The cost is the continuous exercise of supervision and coordination of CBR training between all elements in the Army. OCAFF itself probably is the best procurement agency.

Recommendations

1. An attempt should be made at every level of training to devise performance tests (as contrasted with verbal tests, oral or written) for each skill involved in a standard of proficiency.
2. Trainees should be provided with self-testing measures of skill.
3. Instructors should be provided with measures developed specifically for: pre-training analysis; diagnosis of learning difficulties; attainment of objectives stated in daily lesson plans; and attainment of course or ATP objectives. These performance exercises should conform with test criteria to the same high degree as the 1954 Army-wide individual CBR proficiency test.
4. CBR instructors should be given on-the-job training in the preparation and use of performance tests as training procedures.
5. OCAFF should continue the administration of Army-wide testing of CBR proficiency. This job should not be delegated to those responsible for the conduct of training.
6. Improved means of judging CBR competence in maneuvers and joint operations should be sought.

7. The CBR training program should provide many more direct, firsthand, participating experiences for the learners. Much more contact with live and/or simulated agents should be provided at all levels of training. Whenever possible, individuals and units should be required to act--not merely undergo.

8. Grouping for instruction at all levels of training is needed, and much more opportunity should be provided for men of superior and inferior abilities to have training geared to their capacities.

9. Army instructors should be rigorously screened, adequately educated for the training task to be performed, and rewarded with recognition comparable to that afforded the skillful commander or the soldier who performs brilliantly in a military skill. There is no more important, or in the long range crucial, task in the Army than training.

10. The first contacts that basic trainees have with CBR instruction should be carefully planned so that the complete interest of the men is secured and their attention is focused upon personal survival.

11. At each successive level of training, comparable activities to develop readiness and interest need to be conceived and developed.

12. The pace of the training programs at all levels needs to be relaxed considerably. Tired men do not learn well. More directed individual study should be required at the Chemical Corps School during the regular school day with presentation of new material limited to a maximum of four hours per day.

13. More attention needs to be directed to the physical environment within which the instruction is provided. Out-of-doors classrooms should

be comparatively free from distractions, amplifying equipment should be provided when needed, visual aids and equipment which are used should be sufficiently large that all men are able to see important details, and to the extent possible stand-by indoor space should be available during inclement weather.

14. To avoid having men absent from essential CBR instruction, either the length of basic training should be increased to nine weeks without adding to the training load or the training program should be cut to seven weeks but provided in eight. Then, to avoid individual absences, an entire unit is assigned needed post duties on the same day once a week.

15. The 10-hour course in CBR training should be carefully outlined, planned in detail by central authority—including the content of the lectures which shall be given and the training aids which shall be used. This course should then be screened carefully to eliminate nonessential information and unnecessary verbosity, and to insure sequential learning experiences. It should be provided along with a packaged kit of needed visual aids to all basic training centers.

16. A similar procedure should be followed for CBR training at the advanced individual training level and for POR training.

17. Aids should be provided, and procedures should be developed so that men will be able to check their progress in the development of essential CBR skills.

18. All courses at the Chemical Corps School should be subjected to rigorous analysis and revision to provide additional sequence to the training. ATP's of the "3" series also need much revision in order that sequential experiences may be provided.

19. CBR training should be integrated with other training much more commonly than appears now to occur in practice. More of the hours scheduled for advanced CBR training should be allocated in ATP's to integrated training so that commanders will be encouraged to incorporate CBR into rifle practice, dismounted drill, shop routine, tactics, and field exercises, but it may be necessary to spell out details for all commanders to follow.

20. In carrying out the above recommendations every effort should be made to make sure that men are required to participate—whether it be a lecture, demonstration, training film, or field problem—and that the situations be made as real as possible consistent with needed safety precautions.

21. When the committee system of instruction is utilized, unit noncommissioned and commissioned officers should participate actively in the training. Observed practices of sleeping through CBR instruction periods provide the worst sort of examples for trainees.

22. When the committee system of instruction is not utilized, unit commanders should make sure that persons who provide CBR training are qualified to do so. Successful completion of a course at the Chemical Corps School does not necessarily mean that a noncommissioned or commissioned officer is qualified to teach. Much preparation in advance is needed by men who are "green" in teaching, and time should be provided so that they have opportunities to observe good teaching, specific guidance in preparing learning activities, and supervisory assistance on the job.

23. The Army should develop a program of supervising CBR training operations with the aim of improving the quality of CBR instruction.

The task should be assigned at a level high enough to work simultaneously in the following ways:

- a. To coordinate CBR training activities between different Army areas
- b. To work directly with CBR instructors on an Army-wide basis and also at specific training centers
- c. To muster the resources of CBR science, combat experience, and training competence
- d. To work directly with the sources of supply of CBR instructors and training personnel.